The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXVIII. February 11, 1933 No. 711

Notes and Comments

The Chemical Engineer in Industry

THE trend of modern engineering has been engaging the attention of the Royal Scottish Society of Arts for some time, the fifth lecture in the series being given this week by Dr. R. Lessing, who dealt with chemical engineering and whose survey of the functions and training of the chemical engineer followed appropriately upon the paper by Professor W. E. Gibbs, reported in THE CHEMICAL AGE a fortnight ago, and the reply by Mr. J. H. West last week. In effect each of these authorities, as well as the authors of the American pamphlet to which we referred on January 28, has added his own measure of emphasis to the argument that the chemical engineer is not merely a chemist with a smattering of engineering or an engineer with a smattering of chemistry. What industry in general needs to bear increasingly in mind is that chemical engineering enters to an ever widening extent into a very large number of manufactures not usually associated with chemistry in the popular mind, and that the chemical engineer therefore requires specialised training and adequate recognition of his services.

The chemical engineer, as Dr. Lessing points out, must be competent to bridge the gap between the chemist and the engineer. He must possess sufficient imagination to visualise the connection between the behaviour of atoms and molecules in his test tube and that of many tons in the commercial plant. The chemist is taught to acquire knowledge and spends his life in adding to his knowledge by finding out things, while the engineer is encouraged during his studies and forced in his working life to do things. There has been a tendency in the past to recruit chemical engineers from the ranks of chemists, but they have had to acquire a working knowledge of engineering matters by that laborious and wasteful method of self-instruction—practical experience. Hence the need, which we make no apology for reiterating, for an authoritative ruling from the Institution of Chemical Engineers as to the status, functions and legitimate scope of the chemical engineer, with recommendations as to training.

Chemistry and Gold

THE gold boom that has set in throughout the world during the past few days, may prove to be the turning point in the economic history of the twentieth century. Gold is something more than a chemical element; it has been responsible for much of the romance and progress of the world, and for much of the misery and the joy of life. It has been the source whence have originated many of the wars that have ravaged the world, but it has also been instrumental in promoting the emergence of the world from the barbarism of the dark ages. The alchemists in their search for the philosopher's stone laid the foundations of chemistry, and the travels of the gold-seekers resulted in the discovery of new lands and in the spread of knowledge.

Gold in the modern world provides an example of a curious anomaly—nations can be equally poor without it and with too much of it. To-day we are suffering from a maldistribution of gold. The world is short of the metal while two-thirds of the total supply is sterilised in the bank vaults of two countries. Anything that will considerably increase the amount of gold in circulation will provide powerful assistance to a world struggling back to some measure of prosperity.

A Contribution to Economic Recovery

ALL experts are agreed that a period of rising prices is essential. Increased production of gold will help to raise the commodity price level. A few months ago the discovery was announced of further miles of the great rand gold reef. To-day South Africa has left the gold standard and the local price for gold in consequence has risen from 85s. to 120s. an ounce. It has become profitable greatly to increase the world's output of gold. Whilst the discoveries of gold on the Rand, in Kenya and other places are valuable, they are not the most significant feature of the present gold situation. That lies in the altered policy of the Rand mining companies. The president of the Transvaal Chamber of Mines has explained that the South African Government's changed currency policy has enabled the mining companies to extend their sphere of operations because large masses of unpayable ore would now become payable and the use of these ores would greatly extend the life of the Rand. A beginning has already been made with the policy of mining low-grade ore, and it is practically certain that progress in this direction will continue. Already one mining company has decided to install new plant to increase production at a cost of £700,000 spread over the next two years.

Chemical technology and chemical research has alone rendered possible much of this activity, and may thus be fairly said to have made a striking contribution to the economic recovery of the world. By far the greater part of the new developments, destined apparently to increase so greatly the world's stock of gold, are to recover gold from ores of so poor a character that they were previously regarded as unpayable. There would have been no known method of working these low-grade ores but for the discovery of the cyanide process made at Glasgow in 1887 by R. W. MacArthur and Wm. Forrest, for which the way was paved by previous British investigators such as Wright and Faraday.

Fundamental Research

THE opening of the Royal Society's Mond Laboratory at Cambridge on Friday in last week is an event in the history of scientific research in this country. This laboratory has been erected to provide a home for Professor Kapitza's researches upon the properties of matter in intense magnetic fields which were begun ten years ago in the Cavendish laboratory. The cost of the laboratory has been defrayed from a bequest made to the Society by the late Dr. Ludwig Mond, and provides another instance of the debt that chemical industry and scientific research owes to that remarkable man. By the erection of this laboratory the way has been opened for a wide extension of the facilities for fundamental research in physical science in this country. Those responsible recognise what so many in the more mundane world of business fail to see, namely that periods of business depression are not the time for slackening our efforts in discovery. Fundamental research of this nature has now reached the stage at which the plant needed approximates to the full-scale engineering works scale. Recent experiments upon the transmutation of the elements have necessitated potentials as high as one million volts. The provision of apparatus of this magnitude obviously lies far beyond the means of any man of science, and but for the co-operation of the wealthy, research on the ultimate behaviour of matter must cease.

The Cavendish Laboratory has provided many examples of discovery into the ultimate constitution of matter. The discovery of the electron by Sir J. J. Thompson, the conception of the electron and proton as the fundamental electric entities, the discovery of the neutron, the development of new methods of attack upon the problem of the transmutation of the elements, are some of the achievements of modern science that we owe to this laboratory. We may perhaps look forward to the solution of the problem of the conversion of matter into energy. Hydrogen can be converted into helium with the loss of 0.8 per cent. of its mass and the liberation of 3×10^{18} ergs of energy per gram of original hydrogen; if we can destroy a gram of hydrogen we can generate 4.75×20^{20} ergs of radiant energy. Why should we not do so and thus render ourselves independent of fuel or of any other source of energy? The process is going on in the sun before our eyes. Every second the sun loses four million tons of mass and in so doing gives out each second four hundred million times as much energy as is derived from all the coal burnt in Great Britain each year. That may be the tree that will spring from the seed we have just planted.

Solid Smokeless Fuel

TO many engaged in the chemical industry the manufacture of solid smokeless fuel appears to be the concern of the fuel industries only, and should be tackled exclusively by the gas industry, the coke oven industry or the low temperature carbonisation people. (Low temperature carbonisation has hardly become so established that it can be yet dignified by the appellation of an "industry.") There are grounds for claiming that this view is short-sighted and that the solid smokeless fuel problem is in a real sense a chemical problem. The damage done to buildings and to health by the ravages of smoke is due to chemical constitutents, and the remedy demands the assistance of chemistry also.

The statements made by Mr. J. W. Napier and recorded in our issue of January 28, concerning the desirable qualities of solid smokeless fuel and the best method of manufacturing it, must be regarded as tinged with his natural desire to see that type of plant used for the purpose with which he is most familiar. Nevertheless we believe he is correct in his contention that there is no one low temperature plant working with costs low enough to warrant a sufficiently cheap smokeless fuel being put on the market. There is, however, a definite place for low temperature carbonisation, if only because there are grates, and even districts, wherein high temperature coke, even if of a fairly combustible character, will not burn with sufficient readiness.

An Unexplored Possibilit y

WHAT is needed to make the low temperature process a financial success? The answer is that some other source of financial return must be discovered. The products at present recovered consist of semi-coke, tar or oil, aqueous liquor and gas. It is regarded by most people as essential that the price of semi-coke must come down; it is far above that of normal quality house coal to-day. It seems fairy definite that nothing of financial value can ever be extracted from the liquor. That leaves the tar and the gas. The tar oils are of considerable interest chemically, but have not yet become the basis of a chemical industry; they have been investigated by the Department of Scientific and Industrial Research, and now await the touchstone of chemical discovery which shall ennoble them from their present status of oils for burning purposes to the higher plane of raw material for chemical industry.

The crux of the position may well prove to be the gas. So far as is known nothing has been done with the gases generated in the low temperature carbonisation process other than to use them for burning purposes. The paper recently read before the Institute of Fuel describing the chemical treatment of coke oven gas at the Ougrèe-Marihay works in Belgium may well give a clue to the ultimate use of low temperature gases. No investigation appears to have been made into the chemical utilisation of these gases, and we suggest that the whole problem of low temperature carbonisation should be reconsidered by carbonising experts in collaboration with the chemical industry. If the Belgian chemists can successfully produce synthetic methyl alcohol from coke oven gas, who knows what valuable products may be manufactured from the gases of low temperature carbonisation by British chemists?

German Dye Exports

GERMAN exports of aniline, alizarine and indigo dyes amounted to 20,642 metric tons, valued at £4,665,000 in the first nine months of 1932, which is a drop of nearly 40 per cent. compared with 1930. Considering this decline, the German publication, "Die Metallboerse (Berlin)," feels that world consumption was at a grater rate than the German export decreases. Citing the German dye cartel's latest quarterly report that exports are picking up somewhat it foresees a better 1932 showing than is indicated by the returns.

The Importance of Experience

Some Problems in the Utilisation of Waste Sand

SPEAKING to the Manchester Section of the Institute of Chemistry, on February 9, Dr. W. R. Ormandy recounted some early experiences and the lessons which they conveyed, the subject matter of his experiences being connected with sand.

In the production of plate glass, said Dr. Ormandy, the cast sheets were ground with wet sand under cast iron runners. The sand washed off from the grinding tables was sorted into various sizes and the coarser materials were reused for fine grinding, whilst large quantities of finely divided sand, containing small amounts of glass, iron from the runners and calcium sulphate used in setting the glass on the tables, gradually collected. This so-called waste sand was extremely fine, giving a residue of about 1 per cent. on a 200 mesh sieve. It contained quite appreciable quantities of metallic iron torn off from the runners, and an examination of the oldest sand deposits showed that even after many years standing this iron remained in the metallic state. Obviously treatment with dilute acid sufficed for the removal of this impurity, but even continued boiling with strong hydrochloric acid still left a residue which contained far too much iron to allow of it being used as a constituent of a plate or sheet glass making frit. It was, however, found that at a very dull red heat a current of ammonium chloride vapour succeeded in removing the iron from a product which had been treated by boiling hydrochloric acid leaving a waste sand which was practically white.

Removing the Iron from Impure Silica

Before undertaking any really quantitative investigations on the economics of the process it was decided to make a few hundred pounds of this colourless waste sand in order to make glass from it. For this purpose the purified waste sand was mixed with calcium carbonate and sodium sulphate, the waste sand merely taking the place of the Belgian granular sand generally employed. In the usual way the quantity of the frit or mixture was ladled out on to the top of some molten glass in the glass melting furnace. The experiences of the next few hours put an effective stop to further investigations. Hour after hour the conical mass of frit glazed on the outside, floated about on the molten glass beneath, it being evident that the finely divided product was too good a non-conductor. Whereas the conical heap of frit made with Belgian sand melted on the surface and the fluid glass ran down the sides of the cone, in the case of the finely divided purified waste sand the surface melted and after hours the interior of the cone was not hot enough to char the outside of a potato which was pushed into it on the end of an iron rod.

Useful knowledge, however, was derived from this work. When it was discovered that ammonium chloride vapour would remove iron from finely ground impure silica the question arose as to whether any alumina which might be present would be removed at the same time. Experiments, however, made with synthetic mixtures of alumina and iron oxide showed that the iron alone was rendered volatile and that indeed the method was a quick and accurate one for the quantitative separation of iron and alumina. It was necessary at all times to carry out a considerable number of determinations of the iron contents of Belgian and other sands, and during the work with ammonium chloride it was observed that finely ground silica when heated to dull red and allowed to cool was coloured by the iron in it. Eventually standard samples of the various types of sand employed in the work were ignited and used as comparison samples against which fresh sands were tested. A new sand was ground in an agate mortar, heated for a few minutes in a muffle to a red heat and then moistened with water on a white porcelain plate for comparison with a standard sample, when differences of less than 0.01 per cent. were readily distinguishable.

Difficulties in Brick Making

Attempts to make the waste sand suitable for glass making having failed, attention was directed to the possibility of making firebricks from the materials available in the works, these consisting of the waste sand, very pure Belgian sand as used for plate glass making and less pure local sand used for making glass where colour was not of the first importance, and from silicious material of coarser structure. By means of laboratory experiments it was soon found that the waste sand, if compressed in the mould and then burnt, could be made to give a firm and sound product. If heated to about 800° C. a friable brick resulted similar in character to what was then known as bath bricks largely used by housewives as a general cleaning and scouring material. If burnt to 1,200° C. a sound brick resulted of an even buff colour, whereas at 1,300° C. the brick became much lighter in colour but permeated with a number of black spots at an average distance of about half-an-inch apart. These black spots turned out to be silicate of iron and each spot seemed to rob the surrounding material of its iron, thus accounting for the whiteness of the product.

This peculiar behaviour of the iron was very mysterious and experiments were made with mixtures of iron free flint (obtained from the Potteries) mixed with rouge, made into blocks and then burnt in a muffle which was supplied with a current of oxygen. Even here at a critical temperature of about 1,250° C. these segregations of the iron were found to take place. By using high pressures and making small cylinders it was easy enough to get bodies which were sufficiently strong to withstand handling in a small muffle but such bricks in the green state were far too tender to allow of them being piled 5 ft. or 6 ft. high as would be necessary in a commercial kiln. After much experimental work, however, it was found that if dried waste sand were moistened with dilute silicate of soda solution until the mixture resembled garden soil in consistency such that it would just ball together in the hand the resultant brick when dried fairly rapidly acquired a thin skin of stone-like character which enabled the bricks to be handled and stacked. Here the method of drying to be employed was entirely different to that employed in drying clay. With clay the object was to dry evenly throughout the mass and not to dry the surface much more rapidly than the interior, whereas the object with the waste sand brick was to bring the silicate of soda solution to the surface where it was rapidly dried, forming, in fact, a silicate of soda box full of dry powder.

"Creep" in Steel

Detrimental Effect on Life of Chemical Plant

THE creep of steels requires careful consideration in the design and operation of high temperature plant, said Mr. H. J. Tapsell, in a paper on "Creep in Steels" read at a meeting of the Chemical Engineering Group of the Society of Chemical Industry, on February 10. With high-pressure vessels in the chemical industries some measure of deformation by creep is permissible and, for the moment neglecting corrosion, the life of the vessels is, roughly, inversely proportional to the permissible deformation. Assuming only 1 per cent. deformation in one year is permissible then the average creep rate over that period must not exceed 2.74×10^{-5} in. per in. per day, or 1.4×10^{-6} in. per in. per hour. This rate of creep is too small to be perceived over a short time except by the aid of sensitive measuring instruments, and yet leads to sensible deformation after a long period. The study of the long-time creep properties of a steel at high temperatures may follow either or both of two courses: first an investigation of the general creep characteristics, and second the determination of creep deformation under defined conditions of stress and temperature. For a steel, previously unexamined, the former course constitutes a research devoted to a study of the creep characteristics of that steel in comparison with those of other steels, while the latter course should follow after the suitability of the steel for high-temperature use has been established.

The author went on to deal with the various methods of determining creep properties, both as carried out in this country and abroad. He also touched on the subject of intercrystalline cracking.

The Present Trend of Chemical Engineering

New Directions in which Knowledge can be Utilised

THE fifth lecture in a series on "The Trend of Modern Engineering," arranged by the Royal Scottish Society of Arts, was given on February 7, by Dr. R. Lessing, who dealt with chemical engineering. The lecture was held at the Mining Laboratories, Grassmarket, Edinburgh. Professor H. Briggs, president, was in the chair.

According to the lecturer, it was not until the conception and elaboration in 1790 of the Leblanc process for the manufacture of soda that chemical industry proper assumed its modern form. Development of the alkali and sulphuric acid industries proceeded slowly until about 1870, when the introduction of the ammonia-soda process marked a considerable advance in methods of chemical engineering. At about the same time the discovery of mauve by Perkin led to the commencement of the manufacture of dyestuffs. Both these inventions depended for their success on the devising of equipment suitable for carrying out these reactions on a manufacturing scale.

Unit Operations

The spread of knowledge concerning a large number of chemical processes resulted in the recognition that they all consisted of a series of steps in varying sequence and combinations, which, though differing individually in detail, were common to many of them. American engineers, in an endeavour to systematise these operations and facilitate their study, designated them as "unit operations," such as conveyance of materials, production and transfer of heat, grinding, mixing, screening, filtration, crystallisation, centrifuging, distillation, evaporation, drying, and various forms of reaction treatment. Most of these operations also form part of processes not strictly belonging to chemical industry in the limited sense of the manufacture of chemicals.

The carbonising industry, which in this country deals with about 36 million tons of coal per annum in gasworks and coke ovens, comprises practically the whole gamut of "unit operations." Solids, liquids and gases in the shape of coal, coke, purifying material, sulphate of ammonia; water, liquor, tar; coal gas, producer gas, air and steam; have to be conveyed and stored. The combustion of fuel gas and the carbonising process are thermo-chemical operations. The gas is treated by cooling, by electrostatic methods, by scrubbing with water, creosote oil and calcium chloride, by reaction with solid iron oxide, whilst the working-up of by-products requires chemical plant in the conventional sense.

In the coal preparation industry there is a similar tendency for the application of scientific principles. In one process of coal cleaning, based entirely on chemical engineering operations, the coal is first subjected to elutriation by air, whereby the natural coal dust is removed and collected. The dedusted coal is then immersed in a bath of calcium chloride solution for the separation of truly clean coal from dirt. By applying the laws of settling of solids in fluids, middle products of intermediate specific gravity are recovered as a separate fraction. Calcium chloride is extracted from the individual products by leaching and the diluted solution is reconcentrated. As a result of this process it has been made possible to place on the market coal containing only 1½ to 3 per cent. of ash, and a fuel suitable directly for coal dust firing.

Present Trend of the Profession

The most recent introduction of chemical engineering into power stations is due to the necessity of providing chemical plant for the removal from the combustion gases of flue dust and oxides of sulphur before their emission from the chimneys. This treatment has become an absolute necessity in connection with the super-power stations, such as Battersea and Fulham, which burn upwards of 2,000 tons of coal per day and would, therefore, in the absence of such equipment discharge every day 33 tons of dust and grit, together with oxides of sulphur, equivalent to 100 tons of sulphuric acid into the atmosphere.

The main principles which have a direct influence on the present trend of chemical engineering include the increased range of available materials of construction, mechanisation, increased capacity of unit, continuity of operation, effective heat exchange, application of high pressure and high vacua, close and often automatic control and adjustment of operations, and the application of the laws of physical chemistry and thermo-dynamics. An outstanding development of post-war chemical engineering is that of high-pressure technique. It has made possible the synthesis of ammonia on an unprecedented scale. The experience gained from this manufacture has led to high-pressure reactions for the production of alcohols and has culminated in the technical achievement of the conversion of coal into oil by direct hydrogenation.

The Chemical Engineer

There is adequate proof that chemical engineering constitutes a definite branch of engineering. On the human side it demands a consideration of the definition, function, professional status and training of the chemical engineer, a subject of much controversy. In the opinion of many, he is merely a hybrid between the two professions, and the attempt to combine the vocation of both chemist and engineer in one person is considered to be over-ambitious. The essential difference between the chemist and engineer is one of mentality and outlook. The chemist is taught to acquire knowledge, and spends his life in adding to this knowledge by "finding out things." The engineer is encouraged during his studies and forced in his working life to "do things."

The chemical engineer must be competent to bridge the gap between the chemist and the engineer. He must possess sufficient imagination to visualise the connection between the behaviour of atoms and molecules in his test tube and that of many tons in the commercial plant. On the whole, it is easier for a chemist of the right personality and some mechanical aptitude to grasp the principles of engineering than for the engineer to fathom the subtleties of chemical theory, to appreciate the significance of chemical reactions, or even to understand the chemist's language. The tendency in the past was to recruit chemical engineers from the ranks of chemists, but they had to acquire a working knowledge of engineering matters by that laborious and wasteful method of self-instruction, practical experience. It was the exigencies of the war for the speedy design, erection and starting-up of chemical plant that indicated the need for a short-cut. Chemical engineering departments were, therefore, created at the University of London and elsewhere, but contrary to the American ideas, where early specialisation is insisted upon, the British method hitherto has been to teach the subject in post-graduate courses.

New Dyestuffs Licences

Applications in January

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during January, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 518, of which 455 were from merchants or importers. To these should be added two cases outstanding on December 31, making a total for the month of 520. These were dealt with as follows:—Granted—509 (of which 505 were dealt with within seven days of receipt); referred to British makers of similar products, five (all dealt with within seven days of receipt): outstanding on January 31, six. Of the total of 520 applications received, 510 (or 98 per cent.) were dealt with within seven days of receipt.

Finnish Imports of Sodium Sulphate

DURING the first eight months of 1932 exports of sodium sulphate from Finland totalled 14,700 metric tons. About 10 per cent. of the country's requirements is produced locally, so that imports reflect activity in sulphate pulp manufacture for which it is used chiefly. Finland is the third largest producer of sulphate pulp.

Management Training for Business Executives

Requirements in Modern Industrial Leadership

MR. OLIVER SHELDON, director of Rowntree and Co., Ltd., addressed the Business Research and Management Association on "Management Training for Executives" at a meeting at Andertons Hotel, Fleet Street, London, on February 2. The determining factor in industrial success, he said, is the efficiency of management. That efficiency depends primarily not so much on systems or schemes of management as on the selection of the right type of man power. If industry has the right men in its managerial positions, adequate systems and schemes of management will largely follow. This may appear a self-evident proposition. Do we really act accordingly? Is it not true that industry tends to expend far greater care and thought in the selection of its plant than it does in the selection of its management? Is it not true that industry, when there is need for economy, tends to fly first to making economy in its man power? It is true that industry tends to go to endless pains to ensure that the plant works satisfactorily and that operative workers have every facility to give the best possible results, but at the same time does not give proportionate attention to ensuring that the various ranks of those who comprise the management of industry are equally well provided for? Are leaders in every grade trained in the same way that factory workers are trained? Are the conditions under which managerial work is done studied with the same care that factory conditions are studied? Is the organisation whereby the work of management is carried through studied and standardised to anything like the same extent that the procedure in a workroom is studied in order to obtain the highest possible output?

Personality and Character

It is an essential condition for the progress of individual businesses and for British industry as a whole that far more attention should be given in every concern to the selection and training of all grades of managerial man-power. Industry needs in its managers not only knowledge of the technique of management, but also all those qualities which are normally summarised in the words personality and character. We should be making a vast mistake if we were to assume that purely intellectual attainments in the study and mastery of the technique of management were all that mattered. This certainly is the *new* factor of management, but the older factors of character, ability to win confidence, power of decision, enthusiasm, fine judgment, leadership and a vivid sense of justice, still count as much as, if not more than, ever they did.

The question of selection of the right men is the first step. In the main each business must look to training its own executive and the beginning of this training should be at a comparatively early age. Every business has its own atmosphere, which is amongst its most valuable asset, and a man trained in that atmosphere is the man who best will perpetuate it. That is not to say that as part of that training the executive of the future should not learn—in fact he *must* learn—technique of management. That is where some of the educational activities that have been started since the war can render valuable help.

Recruitment and Training

We must look to recruiting in industry men of the highest possible intellectual standing and ability, providing that such men also possess the qualities of personality that make them suitable to be managers. I hold no special brief for the university-trained man, but given the other qualities we we should expect to find a far larger proportion of men with university or equivalent training going into industry to occupy positions of responsibility.

As regards training, there are almost two stages in this. Firstly, there is the stage of training before the man really assumes a position of major responsibility. He must learn the technique of the particular profession that he is going to take up, and professions allied to it. He must learn the trade in which he is engaged, whether he be an accountant or a buyer or a welfare worker. He must also learn all that is involved in taking responsibility—the importance of initiative, the necessity for vigorous progressiveness, the overwhelming value of making clear decisions, and the essential condition of dealing fairly with all the human problems that arise in business life. Secondly, he must learn by actually performing the jobs himself.

Each executive position should carry a perfectly clear-cut responsibility; unless it does, it is bad training. Every executive position should carry the best rate of pay that the company can afford. There is probably no bigger feature in giving executives confidence in themselves than to make them feel that they are being properly remunerated.

It is a major responsibility of the head of the industrial concern to spend much time in checking the work of executives in their business and perfectly frankly giving encouragement or criticism where the one or other is required. It is immensely desirable, particularly in large businesses, that the executives should have the opportunity of participating in work other than that which is their primary job. Nothing is more difficult to arrange, but it is well worth doing. Because a man is a successful factory manager it does not follow that he has not some useful contribution to make to advertising, or purchasing.

External Agencies

It is doubtful whether in many businesses enough effort is made to interest all executives in how the business is faring; what are the problems of the business; what steps the directors are taking to solve those problems, and, most important of all, to ensure that every executive is fully "sold" on whatever the policy of the business is.

The training of the executive also can be developed through external agencies. There is a great deal to be said for executives getting out into the world, away from their own business, meeting executives from other companies, joining with other executives in the study of modern problems, travelling abroad to examine the conditions in other countries, and in every possible way broadening their knowledge and outlook. That must be our object—to build up in each individual organisation men with, firstly, a real knowledge of their technique, and secondly, men who are big enough to make every business bound forward, because of their own initiative and vigour and breadth. Industry primarily depends on the calibre of those who lead it. Industrial leadership will have larger issues to face, wider organisations to control, more complex situations to resolve, greater obstacles to surmount, and further horizons to scan. Only by setting ourselves with determination to produce the men to carry that burden of leadership can British industry hope to maintain its pre-eminence in world trade.

The World Power Conference

British Papers to be Presented at Stockholm

ENERGY problems in large scale industry and in transport will form the subject of the 1933 sectional meeting of the World Power Conference in Scandinavia. All the technical sessions are to be held at Stockholm from June 28 to July 4. Forms of application for membership will shortly be obtainable from the offices of the British National Committee, 93 Lincoln's Inn Fields, London, W.C.2.

The eight British papers to be presented during the meeting include the following:—"A Survey of Industrial Electric Power Supply in Great Britain" (Central Electricity Board, Harold Hobson; Incorporated Municipal Electrical Association, F. Forrest; Incorporated Association of Electric Power Companies, Charles D. Taite); "Long Distance Gas Transmission in England" (Joint Fuel Committee, Dr. E. W. Smith); "The British Coal Survey" (Joint Fuel Committee, Dr. F. S. Sinnatt and H. E. Mitton); "Some Notes on English Diesel Electric Practice" (Diesel Engine Users' Association, A. E. L. Chorlton); "Electric Resistance Furnaces" (British National Committee, World Power Conference); "High Frequency Induction Furnaces" (British National Committee, World Power Conference); and "British Marine Oil Engines" (British Marine Oil-Engine Manufacturers' Association, I. V. Robinson).

Standard Equipment for Mixing Operations

Meeting the Needs of a Wide Range of Problems

Material for this article has been provided by the firm of John Varley, Ltd., of St. Helens, whose business has been carried on for nearly a century in the centre of chemical industry, and who have made this subject their special study.

MIXING equipment, almost as ingenious as the claims made for it, is manufactured by most firms who make chemical plant. Works engineers frequently modify or design such tackle intended to serve their own particular purpose. That the mixing so effected is incomplete, takes far too long, and uses too much power, is readily admitted by practical engineers. High efficiency is only attained as a result of special knowledge of the subject and experience of the working conditions

High speed mixers (Fig. 1) are employed when the time factor is highly important. Usually a propeller or centrifugal type of stirrer is fitted. Where high efficiency is essential, a draft tube is embodied in the design in order to render the currents of liquor definite in direction. In the centrifugal

Fig. 1.

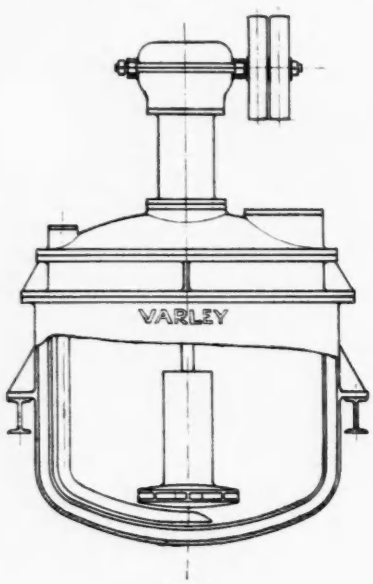

Fig. 2.

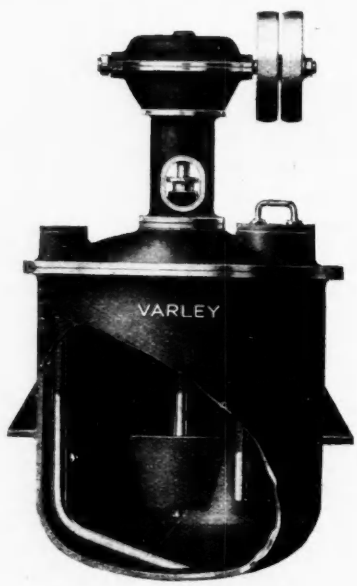

Fig. 3.

type mixer the draft tube takes the form of an extended suction inlet. Vessels of this class are especially useful to the organic industries, and nitrators of all types are constructed to this design. Large mixing tanks for the preparation of "mixed acid" are nearly always fitted with this type of stirrer, on account of the fact that the comparatively simple nature of these mixers makes practicable the use of any of the acid-resisting materials in their construction. This type is also employed where a rapid and positive flow of reacting liquors is essential in order to permit the addition of further quantities of one or other without unduly upsetting their concentration.

The high speed of these stirrers makes it imperative to employ a gear bracket of proved design. An enclosed gear drive is therefore fitted to all mixers of this type, making it possible to obtain the high speeds necessary for efficiency with silence. It therefore becomes possible to operate these vessels in comfort and carry out delicate and accurate reactions with precision and at a surprisingly high rate of speed. As this type of stirrer is comparatively small the inside of the vessel can be fitted with internal coils, or straight plain, or gilled tubes for heating or cooling, without danger of fouling. The vessels, moreover, can be fitted with jackets for steam, water, or oil, and with bottom run-off or a blow-out pipe.

For treating oils and other materials with solids, such, for instance, as the treatment of oils with fuller's earth, or of many liquors with charcoal for decolourising, mixers of the type shown in Fig. 2 give a definite circulation of the liquor under treatment without a draft tube. In a vessel of the correct dimensions this design of stirrer will give excellent results on these jobs, and there is no danger of any blockage occurring, nor of pockets of inadequate movements. A long suction inlet pipe is often fitted so that in a deep vessel there is no chance of liquor at the top escaping the action of the stirrer.

Mixers such as Fig. 3 differ from the propeller mixer (Fig. 1), in that good results are obtained at lower speeds, hence fairly viscous liquids can be satisfactorily dealt with. The agitators produce in the fluid under treatment, perfectly definite current, which are readily calculable with regard both to speed and direction. The representative stirrer is the cone or bucket type. Another type employs a propeller with outer containing case, and another the Archimedian screw.

The cone stirrer is unique in that it produces a definite current, and therefore efficient mixing without the use of extraneous fittings, such as draft tubes and guide vanes. When it is properly speeded and proportioned, there is no other form of stirrer for liquids which gives a more even mixing effect. A valuable feature of the cone is that its height may be altered to suit vessels of different depth, without appreciable loss of efficiency. This characteristic of the cone is particularly useful when a heavier liquid has to react with a lighter one. In this case it is expedient to use a relatively tall and narrow vessel, with a deep cone, so that the heavier liquid, as it sinks to the bottom of the vessel, is continually taken up through the cone and spread over the surface of the lighter liquid.

The propeller with an outer containing case produces motion in definite directions without either a draft tube or a high outer case. Owing to its simple construction, this type is frequently used where enamelled fittings are essential. The Archimedian screw type is used for the treatment of oily and semi-viscous liquors. It thus finds extensive application in the soap and ointment industries and in the treatment of bituminous materials. Correct speed is most essential for efficient operation, and every mixer of this type should be run only at the speed for which it is designed.

To meet cases where it is desired to bring about intimate contact between a gas and a liquid, equipment such as Fig. 4 can be used. Here the action of the cone is to draw the liquor up through the open bottom and force it with considerable velocity through the ducts. The gas to be brought into contact with the liquor is introduced through a

pipe discharging under the cone, so that the gas is mixed with the ascending stream. When it is specifically designed for these conditions, this type of mixer is sufficiently powerful to pick up a fairly heavy precipitate, so that it is of great interest for reactions in which a solid catalyst is introduced into the liquors under treatment.

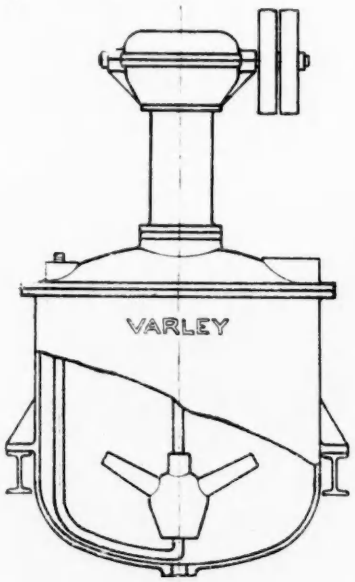

Fig. 4.

Fig. 5.

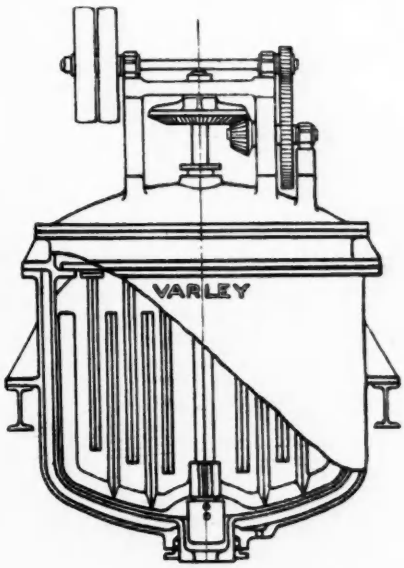

Fig. 6.

Most of the mixers used in every-day practice, for all the miscellaneous jobs which require steady stirring at low speed, are of the stirring arm type (Fig. 5). There is nothing very abstruse about these mixers, but they will quickly even out the concentration in a mixture of liquors when run at a correct velocity. They are especially useful wherever gentle but constant agitation is all that is required. In some cases fixed breakers are fitted to the vessel in order to prevent the rotation of the liquor and to enable the stirring arms, attached to the centre shaft, to break up the streams of liquor. In this way a remarkably complete mixing effect is obtained in a surprisingly short time. These fixed breakers are exceedingly useful when a liquor has to be evaporated to dryness, as they effectively break up the lumps which invariably form when the material is just becoming dry, so that the finished product is a fine, dry powder. Occasionally one of these vessels, fitted with breakers and without a jacket, is used as a light fusion pot and gives quite good results. Where liquors are inclined to be viscous, vanes can be fitted to the rotating element; these vanes tend to give an upward motion to the liquor. Operations in which definite flow of liquor is required, however, are much more efficiently handled by mixers such as Figs. 1 and 3, which are specially designed for this purpose.

A special design for use where a material has to be dried after evaporation from a solution, is shown in Fig. 8. Here the blades or ploughs are independently adjustable so that they can be arranged in the most efficient form as determined by experience. For many classes of material a large number of stirring arms with few ploughs on each gives the best results. In this way the formation of lumps or the building up of material on the walls is prevented. The gearing is of the

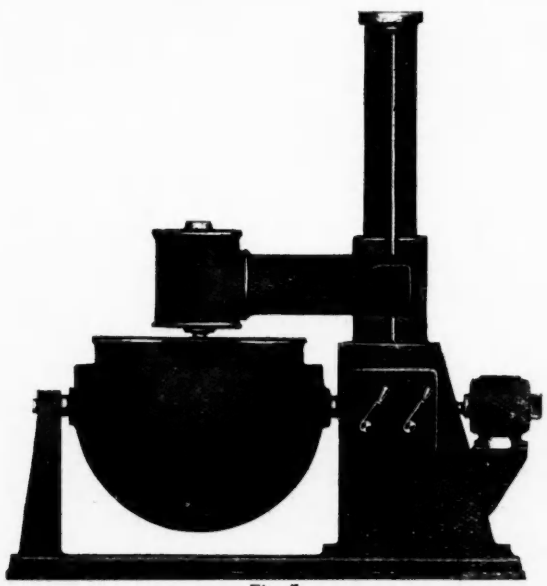

Fig. 7.

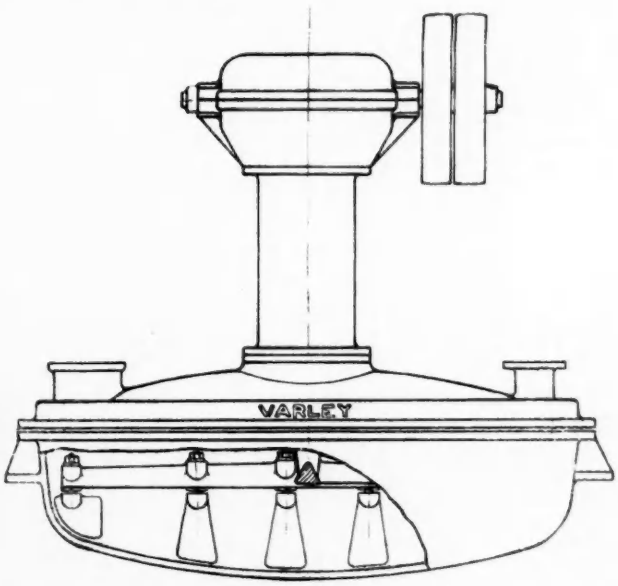

Fig. 8.

enclosed type, which gives a high mechanical efficiency. Special mixers (Fig. 9) have been designed to handle all those operations in which a material of high viscosity is involved. In some cases the material under treatment may even be a pulverulent solid. Slow speed of rotation of the mixing elements and a comparatively high power input are characteristic of this class. Double reduction gear is necessary owing to the desirability of maintaining a high belt velocity with a necessarily slow stirrer speed. Mixers of this class are generally fitted with a mixing element of the blade type working close to the inner surface of the pan. In cases where it is necessary, the inner surface of the pan and the cutting edge of the stirrer can be machined to ensure perfect contact. Frequently, upstanding blades are fitted to the upper surface of the stirring blade. These mesh with similar blades fitted to a cross-beam fixed to the pan and effectively break up the lumps which invariably form when a material is being evaporated to dryness or dried under vacuum.

Tipping mixers (Fig. 7) fall into two distinct classes, those in which the stirrer is stopped before tipping, and those in which the stirrer continues to operate while tipping. Only when there is a danger of a heavy precipitate settling out of a liquid, or of overheating a delicate material, does it become necessary to stir until the contents are completely discharged. Such mixers can be tipped by hand or mechanically. Generally hand tipping is recommended for mixers with pans up to 40 gal.; for larger pans mechanical tipping is much more satisfactory and quicker. In cases where the pan and its contents are removed bodily from the mixer, arrangements are made for the pan to be lifted by hand or by a small winch. Where greater mobility is required a wheel carriage is fitted on which the pan can be moved about. With this type of equipment several pans are often supplied so that one pan may be under treatment while the others are being emptied and prepared for subsequent batches. In general practice, where the stirrer is operated during emptying period, it has

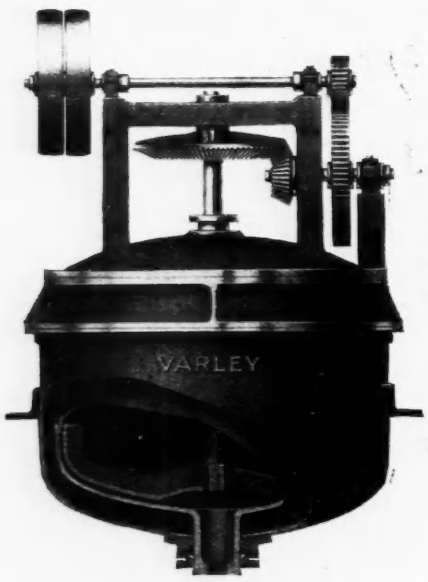

Fig. 9.

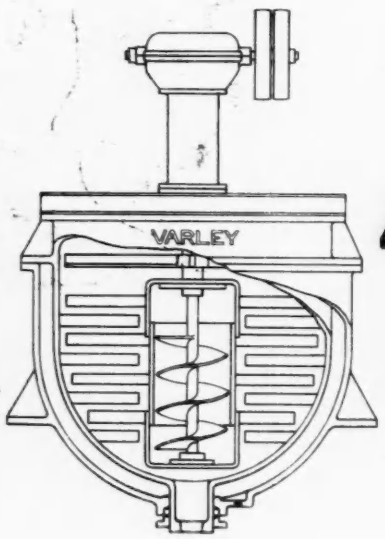

Fig. 10.

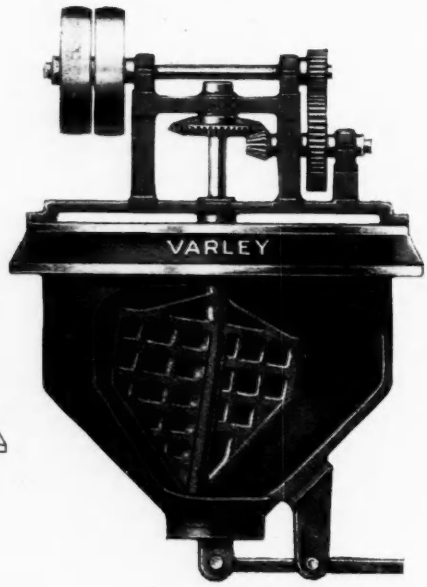

Fig. 11.

Great strength is one of the essentials of this class of mixer and the gearing and stirrers are designed to stand up to the highest stresses that can be transmitted by the belt used. The pans are equally strong and can be jacketed for any pressure or fitted with an oil or lead bath for the higher temperatures. Many of these vessels are used with a naked flame, either direct fire or gas. When fitted with a cover and a condenser and vacuum pump they constitute one of the most efficient batch dryers available and many are used for the most exact work in this connection. A quick-acting charge and discharge mechanism is fitted where the cycle of operations is sufficiently quick to require it. Another desirable characteristic of this type of vessel is that, owing to its comparative shallowness, it gives an equally efficient agitation in both liquids and solids. For this reason it gives excellent service where a liquid is evaporated to dryness and the solid material remaining is dried down to zero moisture content, as for example, in the preparation of anhydrous sodium acetate.

The vessel shown in Fig. 6 is used for mixing bituminous material of great "stickiness," an extremely difficult process which absorbs a great amount of power; for evaporating the valuable material from spent catalysts prior to their regeneration; for leaching values from minerals and from organic materials by means of water or one of the organic solvents, and similar duties. It is provided with a jacket for any form of heating or cooling. The stirrer and breakers are made of cast steel where great strength is essential, or of cast iron when the resistance to corrosion is of greater importance.

often been found necessary to complicate the design to attain efficiency, but in the newest designs this multiplication of detail has been eliminated and the design is remarkably clean and neat.

One particular mixer has been designed for use where it is essential to have the stirrer in motion through the discharge period. Here the stirrer may be operated with the vessel tipped at a steep angle and thus secure the incorporation of materials of widely differing specific gravity which could only be attained by much longer treatment in mixers without this feature. With this mixer a wide range of speeds can be obtained so that different types of stirrers for almost any operation occurring in practice can be correctly speeded to give maximum efficiency. This is exceedingly useful where a range of substances are handled, such as one encounters in the pharmaceutical trade. Compounded stirrers can also be fitted without trouble. For mixing materials like paint, where there is often a heavy precipitate to be disseminated through a more or less fluid mass, equipment of this type gives considerable satisfaction. The vessels provided are generally suitable for enamel lining and can be jacketed if required.

Special purpose mixers are made up from standard gearing and fittings. Fig. 11 shows a phosphate mixer in which the stirring blades are of peculiar design. The soap crutcher (Fig. 10) is another interesting example. Here the central worm produces a rapid and definite flow of the soap through the mixing knives which cut it up and mix in the detached particles in a remarkably short time.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Evils of Laboratory Cramming

SIR,—Your correspondent "Ab Initio" has touched upon an evil which is certainly common in our schools. The present younger generation has been criticised severely at times in the slashing articles of the popular Press, these criticisms being unfounded in many cases and often vigorously refuted. But most charges of untidiness in laboratory students have a firm foundation of truth when applied to pupils in school, and were it not for the more stringent regulations these criticisms would apply also to students in technical college and in university. The young seem to have a natural tendency to leave things strewn about; and lack of parental control makes conditions worse for the science master when pupils enter school laboratories and continue with their untidy habits. The evil must be stamped out while at school, or we shall continue to hear of students above eighteen years of age "being treated like children" in a technical college.

The root of the matter is that oft-debated question as to the sharing of hours between teaching (or lecture-work) and laboratory work. Examination bodies call the tune in the amount and type of chemical learning to be gone through. Practical examinations are not so exacting as is the written portion, and the science master, having to make sure of his daily bread by producing school certificate credits, takes the obvious course of ramming home essential facts in one and a half hours of nerve-racking teaching, and then releasing the penned-up pupils into a laboratory. It is about time our examination councils realised this evil and modified their published syllabuses so as to give learning by practical work a chance. The idea of "teaching by doing" seems to have gone out of fashion, and the heuristic method is also scorned.

Even in technical institutions the problem is not entirely absent. The tendency is for lectures to get longer and time for acquiring laboratory skill is curtailed. Here it is often the student who is to blame, for the majority of students have yet to realise that there are excellent text-books covering most of the groundwork, and that if they would read these regularly, few lecture notes would be necessary. But they ignore the text-books and treasure their notes with a confidence that is pathetic. It has thus become the policy of a number of lecturers not only to *teach* basic principles without allowing any notes to be taken (which should be done), not only to give a few notes on latest developments not appearing in the texts, but to dictate a long summary of groundwork, including invariably "Portions from Partington" or "Variations on an Original Theme by Mellor." It has been suggested recently by Mr. Ivor Brown that duplicated copies of lectures might be circulated in order to get over the difficulty of giving notes and teaching principles at the same time. Certain it is that if students are to have more time for true laboratory training, if they will not read their text-books, then lecturers will have to resort to some mechanical method for imparting a permanent record, be it duplicator or even dictaphone.—Yours faithfully,

"PRO BONO CHIMISTAE."

[A letter from Professor W. E. Gibbs on "The Functions and Training of a Chemical Engineer" is unavoidably held over until next week.—ED. C.A.]

Modern Plastics in Industry

Factors Affecting their Electrical Insulation Properties

THE distinction drawn between electrical conductors and insulators is generally of an arbitrary character, because even the best insulating materials are conductors to a limited extent. In either case it is a passage of electrified particles through the mass of the material. This statement was made by Mr. W. H. Nuttall, F.I.C., in the course of his paper on "Synthetic Resins and other Plastics from an Electrical Standpoint," read before a joint meeting of the Manchester District Section of the Institution of the Rubber Industry, the Manchester Section of the Society of Chemical Industry, and the Plastics Group, held at the Engineers' Club, Manchester, on February 3, when Dr. W. J. S. Naunton presided.

To-day, said Mr. Nuttall, a large number of di-electrics, or insulators, were complex organic compounds, so that any ionisable matter they might contain must be regarded as impurities. A very obvious method of improving insulating materials would be by the removal, as far as possible, of such ionic impurities. At present, very little advancement had been made in that direction, except, possibly, in the case of ebonite. The different methods which had been adopted for the improvement of the electrical properties of ebonite were mainly based upon the purification of the rubber used. The protein matter was removed from the rubber latex by treatment with caustic alkali and by careful washing. It was found that the breakdown value of such purified rubber was raised by some 300 to 400 per cent. By the incorporation of up to about 10 per cent. of a highly absorbent carbon black, it was also possible to improve the general electrical characteristics of ebonite by 50 per cent. Apparently the function of the carbon black was to absorb any moisture and electrolytic matter present. It was somewhat difficult to remove such ingredients from di-electrics generally. The small final conduction current was mainly due to electrolytic impurities. The momentary large initial current, known as the charging current, might consist of two components. The first of these was that known as a displacement of polarisation current. All molecules were held together by electrical forces; therefore, when molecules were subjected to an external electric field they tended to become disturbed. The molecules were put in a state of strain by the displacement of their bound electrons and protons in opposite directions. This displacement was known as polarisation, the hitherto neutral molecules becoming induced di-poles. If the voltage increased sufficiently such displacement might become excessive, and eventually bring about breakdown. A breakdown by dissociation, namely, the tearing apart of protons and electrons, might be the cause of the explosive nature of the breakdown of materials such as porcelain and glass which shatter when subjected to suddenly applied voltage.

With organic insulating materials breakdown by dissociation was not likely to occur, because they were usually composed of colloidal masses in which the molecules existed in such a high degree of association that the possibility of dissociation and ionisation was reduced to a minmum. The second component of the charging current was that known as the absorption current. This was now generally supposed to owe its origin to the presence of permanent di-pole molecules in the di-electric. Permanent di-pole molecules were polar molecules possessing a definite hydrostatic moment. They did not tend to line up in the direction of the electric field This orientation of the di-pole molecules was a very important factor in insulating materials, especially at high voltages, for two reasons. In the first place, electric energy was used up in causing the orientation. This di-electric loss might assume very serious dimensions, especially when dealing with alternating currents at high voltages. A di-electric loss was usually determined indirectly by the power factor which could be measured quite easily. Secondly, the energy dissipated by the turning of the molecules against the friction of the medium revealed itself in the form of heat, and unless the heat was dissipated much more quickly than it was produced the breakdown of the di-electric was assured.

Production of Industrial Alcohol from Grain

Advantages of the Amylo Process

The current issue of "Industrial and Engineering Chemistry" contains an informative article on the production of industrial alcohol by the Amylo Process, the greater part of which is reprinted below.

THE use of the amylo process for fermenting grain mashes owes its origin to the time-honoured practice in the Orient of preparing alcoholic drinks by the use of mould fungi. In Japan, where the drink known as kojii is prepared from rice, or taka kojii where wheat bran is used, cultures of *Aspergillus oryzae* supply the diastase for the saccarification of the starch in the grain. In China, on the other hand, the predominating fungus in the mixture of micro-organism used in preparing similar drinks is the *Amyloces Rouxii*, which belongs to the group of Mucors. In both cases the mould spores are developed on moist grain (either rice, wheat, or bran) and then transferred to the mash to be fermented. While *Aspergillus oryzae* has never been successfully used for the production of alcohol, owing perhaps to its faculty of producing a vigorous destruction of alcohol during the latter stage of fermentation, *Amyloces Rouxii* is capable of inducing a fairly efficient production of alcohol from sugar, and may be used both for the saccharification of starch and the fermentation of the sugar into alcohol.

The Chinese, who employ this fungus in preparing their alcoholic drinks from starchy materials, start with a dough made from rice flour, which is made into cakes and mixed with aromatic herbs, and the whole covered with rice and allowed to undergo spontaneous fermentation. A white mould develops on the cakes; these are dried in the sun, and are known as Chinese yeast. Calmette, as a result of his extensive investigations of Chinese yeast in 1892, found that a certain species of Mucor always predominated in this conglomeration of micro-organisms, and to this species he gave the name *Amyloces Rouxii*. The Amylo process was developed by Calmette and Voidin, at Seclin, near Lille, and subsequently at Antwerp, and since that time this, or other similar processes, has been utilised in almost every country of the world where fermentations of amylaceous materials are carried out.

Operation of the Process

In the original process, the procedure in the fermentation of grain was carried out in three stages: (1) conversion of the starch by heating under pressure; (2) saccharification of the starch by diastatic action of the mould; and (3) fermentation of the sugar by yeast.

The starch of the maize or other grain is gelatinised at 4 atmospheres pressure, and a small amount of sulphuric or hydrochloric acid is necessary in order to produce a thinner paste. It is important also that the gelatinised material be blown from the retorts at the end of the heating period at the maximum pressure in order to disrupt the grain effectively, so that the diastase can induce its efficient action upon the starch. It is often advisable to steep the grain in water prior to the cooking process, so that it can be given a preliminary softening prior to the action of the heat upon the starch. The coarsely crushed maize is usually agitated for one hour with 2 parts of water containing 0.6 to 0.8 part of concentrated hydrochloric acid to 100 parts of grain, which greatly accelerates the softening action.

From the convertors the hot mash is blown through the discharge pipe into an intermediate vessel, and then to the fermenters. The purpose of the discharge into the intermediate vessels is to facilitate the complete disruption of the maize by the expansion of the cells under the sudden release of pressure. The mash is then boiled in the closed fermenters, and the escaping steam passed through the various connections for the purpose of sterilising all of the avenues through which subsequent infection might be introduced. After the sterilisation has been completed, the mash is cooled by running water over the outside of the fermentors, a positive pressure being maintained at all times to prevent the formation of a vacuum and the drawing of infection from the outside. To facilitate cooling of the mash, stirring devices are sometimes employed, and in lieu of these the mash is usually aerated vigorously during cooling to shorten the time required to bring the temperature where it can be seeded with the diastatic mould culture. When the mash has reached a temperature of 40° C., it is inoculated with a small quantity of the culture, usually about one gram of the spores.

For the cultivation of the mould in the laboratory, a medium is used containing 16 to 17 per cent. of starch which is introduced into culture tubes to a depth of 5 cm., or 250 cc. are introduced into litre flasks. These are sterilised at 30 lb. per sq. in. pressure for 20 minutes on two successive days. Another medium, consisting of rice grains moistened with water in the proportion of 1 cc. of water to 20 grams of rice, is prepared and sterilised as the liquid medium in flat layers in large flasks, using just sufficient rice grains to cover the bottom of the flasks. When starting large-scale operations, the tubes containing liquid mash are inoculated with the spores of the fungus and incubated at 38° C. for 4 or 5 days. At the end of this time the surface of the tubes is usually covered with sporangia. The tubes are then thoroughly shaken to distribute the spores throughout the liquid. The contents of the tubes are then sprinkled over the sterile rice grains and the latter incubated for 8 days at 38° C. If, upon microscopical examination, this material is found to be free from bacteria, the inoculated seeds are used to start a seed tub, containing one-tenth of the volume of mash to be fermented in the main fermenting tubs. The mash in the seed tub is sterilised by live steam for one hour at 110° C. and cooled to 39° C. before seeding.

Saccharification and Fermentation

After the inoculation of the mash with the mould, a current of air is maintained on the tub for 24 hours while the mould is developing; at the end of this time the entire mash is usually permeated with the mould. During the entire developing period the mash must be vigorously agitated either by air currents or mechanical stirring in order to prevent the formation of a film of spores on the surface.

In carrying out the fermentation by the Amylo process, it is important that the temperature and the acidity be maintained at the optimum for this species. The acidity of the mash should not be allowed to exceed that equivalent to 2-3 cc. of 0.1 N sodium hydroxide for 20 cc. of mash. After a period of 18 hours the contents of the seed tub is ready to be transferred to the main fermentors, where the acidity should be checked every 6 hours and where the acidity should not exceed 5 cc. of 0.1 N sodium hydroxide to 20 cc. mash Twenty-four hours after the contents of the fermentors have been seeded from the seed tubs containing the mould, it is time to introduce the yeast. The contents of the fermentors are then cooled to 32° C. and seeded with a suitable yeast culture, which has been prepared in a pure condition in a suitable yeast-propagating apparatus, and developed to the requisite volume in a seed tub. The mash is aerated for about 6 hours after the introduction of the yeast, and the fermentation usually completed in 48 hours, the whole process being completed in 3 days. The third stage or alcoholic fermentation of the saccharified mash is in no sense different from any other industrial alcoholic fermentation of grain.

The Boulard Process

In the original Amylo process the saccharification and fermentation of the mash had to be carried out in special closed tanks to prevent the infection of the mash with bacteria and other micro-organisms which might find the substrata suitable for their development. In more recent years there has been developed what is known as the Boulard process, in which a more vigorous and robust species of Mucor is used, known as Mucor Boulard No. 5. This species, which was isolated from grain in the Far East, is characterised by its saccharifying power, and its ability to hold its own in competition with adventitious infection. Consequently it is claimed for the Boulard process that both the saccharification of the starch and the alcoholic fermentation of the sugar can be carried out in open vats, just as in the ordinary grain distillery. In the Boulard process a bub is prepared from the pure culture of

the mould, which is about one-sixth the volume of the main mash. The bub or seed is propagated on sterile mash and in closed vessels, and, when ready, it is transferred to the main fermentors of the open type. Yeast and mould are added to the main mash in the Boulard process simultaneously, and the whole process is completed in 48 hours.

Owing to the rapidity with which the fermentation proceeds, foreign organisms have but little opportunity to develop, and hence there is no necessity for the use of closed and costly fermentors in the process. Under the original Amylo process, the time required for the completion of the fermentation was from 48 to 50 hours longer than the ordinary method. This was quite a drawback, and no doubt has been one of the contributing factors against the general adoption of the process in grain distilleries.

The most important advantages in the process using species of Mucors for the saccharification of starch are (1) economy due to saving in malt; (2) decreases in losses due to infection introduced with the malt; (3) increased yields of alcohol; and (4) higher purity of alcohol formed in the mash. As from 10 to 15 per cent. malt is used on an average on the weight of grain contained in the mash, the saving in the cost of malt is very considerable and certainly worth the effort. Nettleton calculated in 1913 that the saving in malt would make one gallon of 95 per cent. alcohol cost 11¼d. by the Amylo process, as against 1s. 6½d. by the older British method. The general experience of the users of the Amylo process has been that their yields will average considerably higher than when using the malting process for saccharification. It is reported that the yields are about 10 per cent. higher than in the old process, owing to a more complete saccharification of the starch.

Another advantage of the Amylo process over the old malting process is in the elimination of the barley and the substitution therefor of the corresponding amount of maize with its higher starch content. Other advantages of the process that are not generally known, and of which too little, perhops, has appeared in the literature, are the high temperature at which the process can be efficiently carried out, and the relatively high percentage of fat contained in the residue from the still. This residue is easily filterable, as the mycelia of the mould form a firm cake, and the product can be produced as cattle feed and has good keeping qualities. The cake contains 20 per cent. of fat which can be recovered by extraction, and used for a variety of purposes. Owing to the adaptability of the process to high temperatures (the optimum appearing to be from 35 to 38° C.), it should be in great demand in grain distilleries in all tropical and sub-tropical climates.

Usually the concentration of the sugar contained in the mesh is at its maximum (approximately 11.3 per cent.) about 53 hours after the introduction of the mould, after which it falls rapidly.

Neither the Amylo nor the Boulard process has been adopted in England where the excise laws require that the gravity of distiller's wort shall be determined before fermentation by the saccharimeter, which is impracticable in any process where the saccharification and the fermentation of the resulting sugar takes place simultaneously. It is quite obvious, however, that the introduction of the more effective of the Mucor processes for grain distilleries would enable them to reduce still farther the cost of their operation and enhance their opportunities for competing with some of the cheaper sources of industrial alcohol.

Radium Production in Canada

Further Details of the Concentration Process

THE "Northern Miner" (Toronto) in its issue of December 29 publishes the flow sheet which has been worked out for the treatment of pitchblende ores from the Great Bear Lake deposits. The ore as received from the mine, cobbed from the vein material, is reduced in the crusher to four-inch size; it is then passed to a small rod mill, where it is reduced to an average of 35 mesh. The pulverised ore is boiled with hydrochloric acid in a stoneware leaching tank, the solution being then filtered to separate the gangue, for which purpose a stoneware filter with vacuum is utilised. This solution is then received in a stoneware jar of large dimensions, in which barium chloride and sulphuric acid are added in succession in order to separate the concentrate of radium-barium sulphate. From this point, reached by the Government chemists at Ottawa in their investigations of the Great Bear Lake ores, the chemists of the Eldorado Gold Mines, Ltd., follow two circuits, namely (1) the sulphate of radium-barium, and (2) the solution containing uranium and other metals as chlorides.

A Process of Fractional Crystallisation

Following the first circuit, the radium-barium sulphate is boiled with soda ash and filtered. The solution goes to the sewar and the residue is treated with chemically-pure hydrochloric acid, and again filtered. This residue is then sent back for re-treatment, whilst the solution on this circuit is sent to the laboratory for fractioning by crystallisation, being later transformed into a radium bromide. The process of repeated fractional crystallisation consists first of the making of a solution of radium-barium chloride in water; this is then heated and concentrated by evaporation, thus causing a certain precipitation of crystals. These crystals are richer in radium than the solution from which they came. The crystals are extracted, a new solution made, which is in turn evaporated, and the new enriched crystals are obtained. This process is repeated, and at the same time the liquor drawn off from each partial crystallisation is re-treated by various methods over a period of forty-two days, during which accurate records have to be kept at each step. At the finish, a high concentration of radium is obtained by the repeated fractional crystallisation process, and pure radium obtained by a process worked out by the experts.

Eldorado radium will be marketed in various forms, including that of the metal itself. For hospital use the radium bromide is transformed into a sulphate which is inserted in platinum needles called "applicators" these varying in diameter, length and shape, and being most exquisitely made in tiny sizes. The platinum needles are electrically sealed with gold, and the contents of a needle weighing one milligram would be worth £12 to £13.

At the Port Hope plant elaborate precautions are taken to eliminate dangerous concentrations of the emanations. In the crystallisation process in the main laboratory, these are thrown off and therefore the silica glass containers holding the heated steaming solutions must be isolated in a closely fitted glass cabinet having sliding doors. An exhaust fan at the top of the cabinet sucks out the emanations and disperses them in the open air. The laboratory is isolated from the main process building.

Recovery of Uranium and Other Metals

Following the second circuit, the solution containing uranium and other metals in chloride form is treated with soda ash and filtered, the residue being dumped. The solution resulting from this filtration is acidified with sulphuric acid and treated with caustic soda in excess, going thence to the filter presses. From these the solution goes to the sewer, whilst the soda uranate is dried, ground and packed for use in the pigment and ceramics trades. The uranium products which are obtained will be sealed into glass tubes and sent to certain recognised evaluation points, such as the National Research Council Laboratory, at Ottawa; the Bureau of Standards, at Washington; or the Curie Institute, in Paris, where a certificate of the radium content will be issued and payment made on this certification.

The silver content of these deposits appears in larger quantity in the carbonate ores, which will be sent south this year. These will be crushed, ground, screened and then roasted. In the roasting 12 per cent. of the weight will be eliminated at the start.

The residue will afterwards go to the acid boiler, which will transform the silver into silver chloride cyanide in the ordinary way, the gangue being treated as usual. The silver will be marketed in the first instance as a concentrate.

Midlands Chemists' Annual Dinner

Dr. R. H. Pickard's Reminiscences

THE annual dinner, followed by a dance, arranged by the Midland Chemists' Committee, representing the Birmingham and Midland Sections of the Society of Chemical Industry, the Institute of Chemistry and the British Association of Chemists, was held on Saturday, February 4, at the Midland Hotel, Birmingham, and was largely attended. Mr. W. A. S. Calder presided, supported by Dr. R. H. Pickard, F.R.S. president of the Society of Chemical Industry, and director of the Cotton Research Institute, Manchester, and Mrs. Pickard, Mr. W. Rowell, chairman of Birmingham and Midland Section, Society of Chemical Industry, Mr. J. R. Johnson, Dr. E. D. Mason and Mr. D. W. Parkes, vice-chairman of the Society of Chemical Industry, Mr. A. W. Knapp, Mr. J. C. Mann, Dr. S. R. Carter (Birmingham University), Mr. T. F. E. Rhead, Mr. W. T. Collis, Mr. A. J. Broughall (Chemical Engineering Group), Drs. W. M. Hampton, F. W. Pinkard, W. Wardlaw, A. Slater, C. C. Tanner, R. T. Baillie, Mr. F. R. O'Shaughnessy, Professor Hopkins, Mr. E. C. Rossiter and Mr. George King, hon. secretary.

Early Achievements at Birmingham

Dr. R. H. PICKARD submitted the toast of "Midland Chemists," and gave some interesting reminiscences of his days as an undergraduate at the old Mason's Science College in Birmingham, from which was established the present University. He paid tribute to the achievements of Tilden, who was at the head of the Chemistry Department and who, of all others, first laid the stones from which grew the path that led into the mysteries of the essential oil industry. Tilden was followed by Percy Frankland, a forceful personality and who on the pure chemical side taught them to wonder what was the connection between optical activity and chemical constitution. He was persuaded to hold up his hand and say that they were still wondering. The mention of Percy Frankland served to recall the name of one whose work was not sufficiently regarded by the people of this country—he referred to Frankland's father, Sir Edward Frankland. We probably owed more to him for the health of our large cities than to any other man, because Sir Edward Frankland laid down the chemical requirements or specifications of pure water, and the abundance of pure drinking water was one of the essential achievements of chemical engineering. Percy Frankland not only worked at pure science but extended his distinguished father's work, and there was no doubt that to the Franklands we in this country owed a debt of gratitude.

Percy Frankland was followed by Morgan, a versatile man whom he desired on their behalf to congratulate on the honour shortly to be conferred upon him of election as president of the Chemical Society. They admired the work Professor Morgan had done, and they wished him God-speed in his attempts to unravel the chemical mysteries of the carbohydrates which made up so much of our food. Our chemists were not, however, always valued as they ought to be, and he recalled the fact that shortly the bicentenary would be celebrated of Priestley, who Birmingham 150 years ago drove out of the town in a mania of religious persecution.

A Change for the Better

Dr. Pickard said he thought chemists were to be congratulated on the great change for the better that had taken place in recent years in the estimation by the public of their work. This change was very marked when they compared it with the position existing in pre-war days. The chemist had come into his own; it was no doubt a slender "own" at times, but there was a great difference in the remuneration that was paid to juniors to-day compared with the amount they received when he started in the profession. He thought, however, that as chemists they were suffering a little too much from the expectations not only of the public, but of business men, as to the achievements of young chemists. There was, in addition to the chemists who were engaged in chemical and other industries, the research chemist who was employed in almost every industry. He served in industry which in pre-war days, in two of its sections, never had a scientific man inside the doors.

He felt strongly that in a great many industries which since the war had called in the help of scientific people, commercial men were apt to expect too much from them; they wanted to reap returns too quickly. It did not seem to be universally recognised that the scientific man was an individual who had to observe facts. He had to collect the facts, often at great pains, and he could not put forward the results until he was absolutely certain of his ground. There were too many employers who seemed to take the view that it was necessary merely to gather together a few research chemists (paying them none too well), lock them in a room and supply them with apparatus and then expect that within a short time dividends would come through the door in a constant whirl as a result of their work. "Believe me," said Dr. Pickard, "that does not happen. I would emphasise that the chemist has a very difficult road to hold, and that it takes him some time to do that."

Midland Traditions

Mr. W. A. S. CALDER, in a facetious response to the toast, which was honoured with enthusiasm, pointed out that the Midlands had had great chemists in the past, and it also now had distinguished chemists. There were men who were brought up as chemists, but who later forsook the straight and narrow path of science for the broad and primrose way of commerce, but he was glad they never forgot their chemical training, to which, of course, they owed much of their success. Midland chemists were, he believed, maintaining fully the high traditions of their calling.

On the proposition of Mr. H. W. ROWELL the health of Mr. George King, who was responsible for carrying out the arrangements for the gathering, was honoured.

The dance followed, and during an interval Mr. King showed a film which he had taken of various important gatherings in connection with various chemical societies.

Fuel Research in Great Britain

"An Enterprise of the Greatest Failure"

ADDRESSING a joint meeting of various technical organisations connected with the chemical, coke oven and metal industries at Newcastle last week, Professor H. F. Armstrong described fuel research, as now conducted, as the greatest failure he had witnessed, and urged the appointment of another Royal Commission on coal. In early days, he said, he had often deplored our English ineptitude, due in no way to the lack of scientific ability, but to the ignorance and lack of enterprise of our commercial class. The position had been retrieved since the war, but we still allowed the commercial mind to exercise undue control. Only in Germany had commercial men acquired a due sense of perspective and learned to take their place with others, to pay proper respect to those who made the goods and to realise that, however essential, they were but parts of an organisation.

"The greatest failure I have witnessed," said Professor Armstrong, "has been that of fuel research, as conducted by the Fuel Research Board of the Department of Scientific and Industrial Research. The beginning made was such that the enterprise was doomed to failure. It has never been under competent control, it has never had a definite purpose or policy, and it has done nothing of real value." The Board had cost £40,000 a year from 1920 to 1925, and since then the expenditure had more than doubled. The capital cost and maintenance of the station was £400,000, and nothing had been got for it. "The best way to mend the station," he added, "would be to end it." As a scientific critic he objected to work being done which is of no consequence, public or scientific, and as a sorely burdened taxpayer he protested against any further expenditure until a clearly defined national policy for coal had been developed, and competent leadership secured.

The Choice of Heat Insulation Materials

Fallacy Underlying the Use of Common Laggings

WHEN considering the wide range of materials which serve as "insulation" it is noticeable that each material is restricted as to the temperature for which it is suitable, not on account of its conductivity-properties but by reason of the fusibility or decomposition of the materials. This was the outstanding statement made by Mr. A. Lindsay Foster, M.I.Mech.E., in opening his paper on " Heat Insulation," at a meeting of the Institute of Fuel, held at the rooms of the Chemical Society, in London, on February 8. As the temperature rises, with increasing need for heat conservation, the conductivity of available materials increases until we find that the refractory material with relatively high conductivity often has to stand alone, which has been the condition of the open-hearth steel furnace arch and may still continue to be so pending further development.

While the insulation of high temperature furnaces presents certain difficulties, their nature is not always clearly appreciated. This was aptly illustrated in a recent discussion when prominence was given to the fear that if a furnace wall or crown were insulated the furnace wall would be melted. Furnaces of any importance are subject to control as to the temperature at which they work, and it may be taken that, unless for exceptional cases, the temperature of any particular furnace is kept within specified limits and that if insulation be added to a given thickness of wall less heat will pass outwards, but the supply of heat will be reduced so as to keep the desired temperature in the furnace.

The Temperature Gradient

The temperature gradient through the refractories will alter so that their outer faces will be hotter than before. The hot layer exposed to the flame, which may be regarded as being approximately at furnace temperature, will be thicker, and that may affect the rate of erosion at the surface, which, of course, depends upon the velocity of the gases and other conditions in the furnace. When considering a refractory backed by insulation, it is, therefore, necessary to bear in mind that the brickwork of the arch will not only be at a higher average temperature but there is always the possibility of leakage of heat through joints.

Passing from high temperatures to the relatively lower temperatures at ports, regenerators, flues, etc., there is plenty of scope for insulation and little difficulty in achieving useful gains, but it is important to watch for what may be termed the lower limit of the usefulness, so that money is not wasted on conserving heat which cannot be recovered and will pass away in the chimney gases. When waste heat boilers are in use it is important to insulate the flues, and, if it can be done safely, the reversing valves, since the efficiency of the boiler depends upon the temperature of the gases with which it is supplied. If, on the other hand, the possible use of a waste heat boiler is being considered, it is important to investigate the heat losses at the flues and the lower parts of the regenerators, as it is likely that by insulating these the temperature available in the chimney gases may be appreciably raised.

Unspecified Compositions

Over the range of temperatures from about 1,000° C. downwards there is a fair range of choice in insulations, but limits of refractoriness again regulate our choice and it is necessary to grade the structure of the wall: the more so as heating in this range and on smaller units is often carried out by means of fuels costing about threepence per therm or more when temperatures have to be reasonably uniform or closely regulated. Many so-called insulating materials are of unspecified composition, and, while specimens may be subjected to test for heat transmission, the composition of the bulk as applied in practice is liable to variations in the course of making-up and applying, which it is difficult and even impossible to check.

Despite the amount of attention which has been given to developing good insulating materials, there are still those who are prepared to pay for unspecified " compositions" or "common lagging" of which the performance is unknown or is, at least, conjectural, their one claim being "cheapness." The fallacy underlying their use is that the labour in their application is substantially the same as that of a first-class and reliable material, and the total cost for equal insulation, if or when that may be possible, would even be greater than a first-class material. It is quite possible by the application of inferior insulating material to increase, rather than reduce, the heat losses. This, of course, only occurs in the case of small pipes covered with very poor material. The heat losses reach a maximum when the outside diameter expressed in feet, of the insulation is equal to twice the co-efficient of heat transfer by radiation and convection of the insulated pipe.

Expansion Under Heat

Materials used as insulation have negligible expansion under heat and, if applied as plastic, can only follow the extension of the heated metal by loosening the hold on the metal or separating into small units divided by tiny fissures. Those applied without adhesion must allow the pipe to slide within them, or, if resilient, like glass silk, follow the surface on which they are mounted. During recent years new forms of insulation have been developed to meet the conditions of superheated steam at temperatures above that at which magnesium carbonate decomposes, resulting in greater diversity than ever in insulating practice, so that the engineer is confronted with a rather complex problem when specifying, and many specifications which have become standardised in years past have needed revision.

An engineer who has made a study of the available materials may decide that a particular one is best suited to the job and wish to specify it; on the other hand, he may fear that by doing so he may restrict his opportunity to order on terms most favourable to his principals; but that brings us to the commercial boundary which it is not proposed to cross. The essential features are the degree of insulation required, and the conditions of service which will together determine which materials are most suitable. In some specifications " efficiency " is specified, and in certain cases the maximum permissible temperature at the outside surface of the insulation is given. Some engineers specify for good insulation that the thicknesses of insulations shall be equal to the inside radius of the pipe to be covered, up to a given maximum thickness, but the only really satisfactory method of specifying is undoubtedly to state the permissible heat loss per unit area of surface in heat loss per hour.

The Question of Efficiency

It is not uncommon to hear the question asked about some particular insulating material, " What is its efficiency?" without any reference to temperature or thickness. This " efficiency " is only a figure to express the ratio of the heat saved by the insulation to the amount which would be lost if no insulation were applied to the surface in question, and is deduced from two sets of observations, both of which must be carried out on strictly similar apparatus under controlled conditions. Its merit lies in a facility for comparing results from different trials with the same apparatus under the same conditions; but it is of no direct use to an engineer who wishes to calculate the thermal losses at the insulated surfaces of a different type of heat apparatus.

It is to be urged that the degree of insulation be specified in B.Th.U. per sq. ft. of surface to be insulated. This leaves the thickness of insulation to be estimated to suit the properties of any particular material and places on the supplier the onus of using the correct thickness to meet the conditions. The lower conductivity insulations are specially valuable when dealing with small pipes, since on the smaller radii one more quickly reaches the limit of desirable thickness, and it is impossible to achieve a decent degree of insulation with the inferior so-called " compositions."

IT is announced that Yahagi Power Company will establish a subsidiary company, with a capital of 3,300,000 yen (£331,000 at par) to be known as the Yanagi Nitrigenous Fertiliser Co. It is anticipated that the factory of the new company will be established in Nagoya and will produce annually some 5,000 tons of nitric acid and 20,000 tons of sulphate of ammonia.

The Study of Surface Films

Investigations leading to New Knowledge on Molecules

THE properties of molecules as learned from surface films were dealt with by Dr. N. K. Adam, of the Sir William Ramsay Laboratories of Physical and Inorganic Chemistry, University College, London, and Imperial Chemical Industries, Ltd., in the course of an informal talk to the Birmingham and Midland Section of the Society of Chemical Industry, on February 2.

According to Dr. Adams it was shown by Pockels, Rayleigh and Langmuir, that many insoluble substances will spread over a clean water surface to form a layer one molecule thick, floating on the water surface and anchored to it by adhesional forces, which are of course identical with the chemical forces of primary or residual valency. Such unimolecular films offer an exceptional opportunity for studying the properties of the molecules in the films. It has been found that the films exist in several states, which closely resemble the solid, liquid and gaseous states of matter in three dimensions. The amount of lateral adhesion between the molecules determines whether the films are coherent or composed of molecules moving separately in the surface. The degree of stability of the films depends on the strength of the adhesion to the water, and gives a rough measure of the affinity of the polar groups in the molecule for water.

In many films the molecules are packed closely, side by side, in simple arrangements. Molecules with a long hydrocarbon chain, and a single water-soluble group at one end, generally stand upright in the surface with the water-attracting groups downwards, adhering strongly to each other laterally so as to form a compact, coherent film. If the hydrocarbon chains are shorter, the packing often becomes less compact, and probably in such films (called "expanded" films) the hydrocarbon chains are oscillating violently from side to side. If a second water-attracting group is introduced, at a distance from the first, the molecules usually lie down flat, and the film ceases to be coherent, but consists of large numbers of molecules swimming about independently in the surface. The properties of the molecules are always those to be expected from solid models made up on the bases of the constitutional formulæ of organic chemistry, and the surface films therefore indicate that these formulæ are an accurate representation of the actual construction and shape of the molecules. The dimensions of molecules found from the films agree well with those ascertained by the analysis of crystals by means of X-rays.

Much may be learned from surface films about the constitution of complex molecules, such as sterols, vitamin D, and other compounds whose structure has not yet been fully unravelled by chemical means alone. In fact, where surface films can be formed of sufficient stability to study, the examination of these films, which can be quickly conducted, affords a valuable new means of investigating the constitution of complex substances. Most of our knowledge of the structure of these films has been gained by studying their behaviour under lateral compression. This gives direct information on the shapes and sizes of molecules, but additional means of investigation are now being employed. The most important of these is the study of the change in electric contact potential at the water-air surface, caused by the presence of the films. This is connected with the distribution of electric moment. Although it appears difficult, at present, to give a complete interpretation of all the results of measurement of this "surface potential," there is no doubt that it is a valuable new method, and that it gives independent information as to the homogeneity of the films. It also often indicates the orientation of the active, water soluble groups in the molecules, whereas the old method only indicated the orientation of the whole molecules.

Affairs of a Tar Distiller

Statements show Deficiency of £47,478

SAMUEL JONES, tar distiller, of The Cedars, Castle Bromwich, came up for his public examination at the Birmingham Bankruptcy Court, before Mr. Registrar Glanfield, on February 1. The debtor's statement of affairs showed liabilities expected to rank for dividend amounting to £47,478, there being no assets.

The debtor, who gave as the cause of failure "liability as guarantor on behalf of a limited company," commenced business in 1899 at West Bromwich as an oil factor in the name of Jones Brothers. On March 23, 1908, a company was promoted and registered as Jones Brothers (West Bromwich), Ltd., with a nominal capital of £2,000, which in December, 1928, was increased to £25,000 in £1 ordinary shares. The company took over the debtor's business and traded as chemical manufacturers and oil merchants at West Bromwich. The consideration paid for the business was £2,350, which was satisfied by the allotment of 960 fully-paid £1 shares in the company and the discharge of liabilities of the vendor's business amounting to £1,390. The debtor was appointed managing director of the company at a salary of £300, which was increased to £550 in June last year.

In answer to questions, the debtor said that altogether he acquired in the company 5,518 shares. No dividend had been paid by the company on these shares. The distribution by allotment of additional shares was made from the profits earned.

In April, 1929, the company owed you £3,300?—The figure is in the balance sheet.

What was that for?—For commission, because my salary at that time was £300.

You have been drawing pretty big commission?—Yes. The debtor said it was divided between him and his brother.

Were there other substantial shareholders besides you and your brother?—No, sir.

In August, 1926, the debtor was appointed director in a company registered as Road Supplies and Construction, Ltd., at a remuneration of from £300 to £400 a year. The debtor stated that he acquired 2,100 £1 preference shares and 4,000 5s. ordinary shares in the company, for which he paid cash, borrowing the money from Jones Brothers (West Bromwich), Ltd. As a director of Road Supplies and Construction, Ltd., he signed a joint and several guarantee to secure the company's bank overdraft. The overdraft was further secured by debentures, and a receiver was appointed in May, 1929, and took possession of the company's assets. The bank issued a writ for the amount due under the guarantee, and in September, 1929, obtained judgment for £44,059, which had been reduced by payment made by the debtor to £43,514. Failing to meet this claim, the debtor was served with a bankruptcy notice, which was followed by the petition on which the receiving order was made.

The debtor said he was also a director in a company registered as Rainford Tar Products (Ltd.), in which he acquired 1,334 £1 shares which were allotted to him in consideration of a business connection which benefited the company. The concern had since closed down. In May, 1926, he was appointed director of a company registered as Waymack (Ltd.), acquiring shares for which he paid £2,000, borrowed from Jones Brothers (West Bromwich), Ltd.

The Official Receiver pointed out that in two instances the debtor had borrowed more than £5,000 from Jones Brothers. The debtor agreed, and said in April, 1929, there was a credit on his account with Jones Brothers of £3,300.

The Official Receiver: Apparently there are no assets available?—That is right, sir.

Is that the true position?—Yes, sir. These three companies drained me dry.

The examination was adjourned until March 1, the debtor being ordered to furnish certain accounts of his transactions with Jones Brothers.

New British Dyestuffs

Meeting Varied Demands for Colour Using Industries

FOUR new additions to the growing range of British dyestuffs are announced by Imperial Chemical Industries. Rhodamine 6GBS is a little bluer in tone than Rhodamine 6GDN and is of considerable importance for use in all branches of the textile dyeing and printing trades. This product is eminently suitable for printing yellowish red shades on cotton, wool, silk and artificial silk materials. It possesses the valuable property of being resistant to reducing agents, and on this account is particularly valuable for use as an illuminating colour in the hydrosulphite discharge style. It is of importance for dyeing on discharged tannin mordants, for brightening alizarine pinks and for use as a resist colour under aniline black. For the dyeing of wool it is especially of interest where bright shades of good fastness to stoving and milling are required. Particularly bright shades are obtained on unweighted or weighted natural silk. This dyestuff is also eminently suitable for dyeing coir, wood chip and allied fibres and for the colouring of soaps.

Solonchrome Black RNC50 is a product of the same type as Solochrome Black RN and is suitable for all purposes where this established brand is being used and, in addition it possesses a little superiority in washing and milling fastness. It is specially recommended for the production of full blacks on worsted piece goods containing cotton or viscose effects which are to be preserved. Its excellent level dyeing properties enhance its utility for application to piece goods. In addition it is recommended for application by the afterchrome method.

Monolite Red 4RHS Powder is an insoluble pigment dyestuff, bluer and brighter than Monolite Fast Red BS and possessing similar high grade fastness properties. This product is of particular interest for the production of high class printing inks, cellulose enamels, water paints and distempers fast to lime and alkali, possessing good light fastness. Its excellent fastness to akali renders it suitable for the manufacture of inks for soap wrapper printing, etc., where fastness to light and alkali is an essential feature. It also finds considerable use for the colouring of wallpapers, linoleum, cement compositions and mural decorations. In use it requires no precipitating agent for the development of the shade; it is simply mixed or ground with the required substratum into the process medium and is ready for use.

Monolite Rubine 4BS Paste represents the bluest of the Rubine group of Monolite colours and possesses those high grade fastness properties associated with Monolite Rubine 2BS Paste. It is eminently suitable for the production of high grade printing inks, of all classes, fast to varnishing and when used as a calcium lake is characterised by its brilliance and extreme blueness in undertone. In addition it finds use for the manufacture of oil and water paints, for the colouring of wallpapers and surface papers and for non-bleeding cellulose lacquers possessing good fastness to light.

Dangers of Over-Efficiency

Views Expressed by Professor Alexander Findlay

SPEAKING at a joint meeting of the Glasgow Section of the Society of Chemical Industry with other Glasgow societies on February 3, Professor A. Findlay, of Aberdeen University, said that it was due to the closer union of theoretical and practical knowledge that the efficiency of many industrial processes had been increased. In this country, perhaps more than in any other, such co-operation was necessary. The industries on which this country grew wealthy were such that their dependence on science was not very obvious, or owing to lack of competition and to the existence of the whole world as our market, the necessity of diminishing waste and improving production by the application of more scientific methods was not very strongly felt. It was the demonstration of increased efficiency produced by scientific control, during the testing period of the war, that made the ultilitarian appeal of science carry conviction to manufacturers. With the closer relations which have been established between the workers in pure science and those engaged in applying the discoveries of science, there has come a clearer understanding of the mutual benefits to be derived from the close co-operation of theory and practice. This close connection between pure scientific research and its application to industrial practice has made it obvious that, in the words of Professor Whitehead, "Necessity is not the mother of invention; knowledge and experiment are its parents."

Fuller recognition of science has been urged on the grounds that it increases efficiency in industry and the production of wealth. While being grateful for the many material benefits which science has provided it is always necessary to bear in mind that the gospel of efficiency, while it may bring salvation to our industries, will, if carried into action without regard to higher considerations, be productive of great evil to the people and to the country. The loss of individual freedom, the suppression of the sense of individual responsibility, the destruction of human values and the conversion of man into a machine are the price which must be paid for industrial efficiency. That price may be too heavy. From this root there too easily springs a ruthless materialism. We must therefore beware of worshipping scientific efficiency; it is enough to make it one of the articles of our creed. The idealistic side of scientific discovery should never be lost sight of in the clouds of utilitarianism. For the community as a whole it is not the acquisition of a knowledge of the facts of science, but the becoming imbued with the spirit of science that is of importance. It is the inculcation of the spirit of science that we must ever hold before us in all our schemes of education, whether in schools or in universities.

Science and Government

The first great aim of science is the seeking out of truth. It is this desire for truth that we must hold up as an inspiration to the community. Scientific truth is based on a passion for facts or verifiable knowledge, and on the orderly arrangement and grouping together of related facts into scientific laws. It is the work of the man of science, from partial glimpses, illuminated by the light of inspired vision, to discover the laws by which the universe is ordered. The spirit of science is not to be found in the amassing of facts, but in the hypotheses and theories which are the product of imagination and inspiration.

In considering what part men of science should play in affairs of State, said Professor Findlay, it is unfortunate to observe the great disservice which has been done to the cause of science by the extravagant claims made by individual men of science. They demand for scientists a special and a supreme position of power in the government of the country. But this claim is not supported by the general body of men of science. In connection with many of the practical activities of government—in the planning and execution of schemes of a technical character, schemes for the conservation and economic utilisation of natural resources, the control of the purity of food and the preservation of health—it is true that the claims of the man of science are indisputable and have been largely recognised. The task of government, however, is much too varied and complicated to be undertaken by any one class of men. One reason for the comparative failure of men of science to take a more conspicuous place in administrative work is to be found in the too narrow and too highly specialised nature of their training and ultimate duties. The man who desires to fit himself for the task of government must submit himself to wider and more liberal training than is demanded of the specialist in science.

Fair Play for Gas

Interim Report of Gas Legislation Committee

IMPORTANT proposals designed to enable gas undertakings to offer attractive terms for the expansion of the application of gas as a fuel at prices competitive with other fuels, especially imported oils, and to prevent the loss involved in furnishing supplies of gas to uneconomic consumers from falling so largely on economic consumers, are contained in the second interim report of the Gas Legislation Committee, published recently by H.M. Stationery Office. The committee states that while the existing flat rate system of charge and dividend control has worked well for many years, changed conditions, such as the increasing importance of gas as a heating agent as distinct from its use for lighting purposes, have rendered it necessary to consider a change in the system, especially if home-produced fuel is to hold its own against imported oil. It cannot be maintained that the flat-rate system of charge is equitable, either as between gas undertakers and their consumers or as between various classes of consumers. It affords no facility for adjustment in price to allow fairly for the nature, extent, and period of demand.

On grounds of fairness, and because of the necessity for extending the use of home-produced gas fuel, the committee would be prepared to endorse the views of the National Fuel and Power Committee that facilities should be granted for the introduction of two-part charges by gas undertakers, but it finds that the adaptation of existing gas legislation to permit of this, and the education of consumers as to the desirability of the change, present serious practical difficulties.

Another difficulty in introducing two-part charges arises out of the position of pre-payment consumers, who number about 50 per cent. of the 5½ million supplied by statutory gas undertakings in Great Britain, and consume about one-third of the quantity sold. The committee has given considerable thought to the universal application of two-part charges to prepayment consumers, and has come definitely to the conclusion that the difficulties are so great as to render a practical solution impossible, at any rate at present.

The committee recommends that undertakers desiring to introduce two-part or other charges should do so by entering into special contracts with their consumers by virtue of the provisions of Section 13 of the Gasworks Clauses Act, 1847. Undertakers should be required to publish particulars of the "ordinary" price at which they are prepared to supply gas in accordance with their statutory obligations.

Other recommendations deal with special charges for "stand-by" services, the position of maximum and standard price companies, provision for reduction of dividend authorisation in the basic system of control, and the obligations of companies operating under the basic system.

The Society of Public Analysts

Joint Meeting with S.C.I. Food Group

A JOINT meeting of the Society of Public Analysts with the Food Group of the Society of Chemical Industry was held on February 1, at the Barnes Hall, 1 Wimpole Street, by kind permission of the Royal Society of Medicine, the president of the Society of Public Analysts, Mr. F. W. F. Arnaud, presiding.

Certificates were read for the first time in favour of A. T. S. Babb, S. H. Cakebread, H. Phillips and W. D. Raymond. The following were elected member of the Society: Clifford K. Bounty, Raphael H. Callow, Miles E. Catt-Camfield, John Dewar, B.Sc., Clifford W. Herd, Henry H. Jones and Frederick L. Okell, F.I.C.

The PRESIDENT extended a welcome to the members of the Food Group of the Society of Chemical Industry. He then gave a brief outline of the improvements which had been carried into effect by the British farmer to ensure the production of sound fruit prior to the storage process.

Preservation of Soft Fruit

Dr. L. H. LAMPITT, chairman of the Food Group, referring to the methods of preserving soft fruits, pointed out that the jellying power of soft fruits were reduced or destroyed by freezing. Preservation of lemon juice by the action of cold was effected provided that not too much essential oil was present but the process was ineffective for orange juice.

Dr. EZER GRIFFITHS, discussing the technique of the pre-cooling and transport of fruit, gave a description of plant and refrigerating trucks as used in South Africa. He also gave an account of the apparatus used for measuring the moisture at the optimum storage temperature and the relationship between the temperature and atmospheric moisture, and discussed the laws governing evaporation from surfaces.

Mr. HAROLD WILLIAMS called attention to the effect of the carbon dioxide produced by apples on the development of "brown heart." For apples in cold storage the best results were obtained by causing the air to circulate so as to remove carbon dioxide and prevent moisture settling on the surface. Pre-cooling was not essential in temperate climates.

Mr. T. RENDLE said that fruit kept in cold storage had not the flavour of the original fruit. A method that would enable soft fruits to be kept until they were out of season had yet to be devised.

Mr. A. SAMSON said that storage of soft fruit in carbon dioxide was useless. Freezing in 30 per cent. syrup was the most effective method of preservation, but exposure of the frozen fruit to the air caused oxidative changes which destroyed the flavour. Oranges could not be preserved under conditions suitable for apples. Storage in an inert gas, such as carbon dioxide, hydrogen or nitrogen, or in a vacuum, was ineffectual.

Destruction of Clothes Moths

Wool Protection by the Use of Chemicals

THE British Wool Industries Research Association, one of the industrial research associations formed under the auspices of the Department of Scientific and Industrial Research, has recently been carrying out experiments on the protection of woollen clothing against clothes moths. It has been estimated by a reliable authority that, under favourable conditions, the progeny of one female clothes moth can consume 92 lb. of wool fibre in the course of a year. The total quantity of wool rendered useless by moth grub activity is, of course, much in excess of the actual quantity eaten, and an average loss per annum of £1,000,000 in this country is not an unreasonable estimate.

Complete freedom from moth attack can be obtained in the case of small quantities of materials by excluding excess of the insects during storage. This can be effected either by storing in perfectly sealed cases or by careful wrapping in still paper, preferably of double thickness. A strong brown paper bag with the open end folded tightly several times gives the necessary protection. The custom of placing odorous substances among stored articles of clothing as a method of warding off the female moth is also well known, but the degree of success attained by this method depends upon the substance used. No protection whatever is obtained by merely dusting with pepper, eucalyptus leaves, quassia chips, soda, pyrethum stems, lead oxide, lime borax, powdered sulphur, lavender flowers, tobacco powder and many other substances. Naphthalene, which to some extent repels moths, destroys the active grubs when the vapour from the crystals is confined in air-tight containers. Indeed, the only reliable way of obtaining satisfaction with this substance is under the latter conditions, and even then a large concentration is required. Even a small cupboard would require over 5 lb. of naphthalene.

Another and much more potent substance is paradichlorbenzene, a crystalline substance which gives off a relatively heavy vapour, innocuous to man but possessing strong larvicidal properties when confined. Paradichlorbenzene has a sickly penetrating but not entirely unpleasant smell, which tends to remain in the goods. The odour is quickly removed, however, by placing the material in a draught of warm air. Dichlorethan and other substances are claimed to be as good as or preferable to paradichlorbenzene. Both camphor and fresh pyrethum powder are also efficacious in killing the grubs when used in a confined space, although they are of less value than naphthalene and paradichlorbenzene. Sulphur fumes produced by burning sulphur candles, in a concentration of about 1 lb. of sulphur to 1,000 cu. ft. of space for 24 hours, is an efficient remedy.

Award of the Duddell Medal

Professor Gaede's work on the Vacuum Pump

THE Council of the Physical Society has awarded the tenth Duddell Medal to Professor Wolfgang Gaede, director of the Physical Institute at Karlsruhe, and until recently professor of physics at the Technische Hochschule there. Professor Gaede's name is indissolubly associated with the designing and production of high vacuum pumps, which during the last quarter of a century have revolutionised the art of vacuum production. Before 1905 the production of a vacuum beyond that attainable with a filter pump or piston pump was a tedious operation, carried out almost always with a mercury pump of the Toepler or Sprengel type. At the age of twenty-seven Gaede designed a rotary mercury pump which was simple, easy to work and marked a great advance, but since then he has produced at intervals an army of vacuum pumps, each with a definite field of utility, and some of which are based on wholly new principles developed largely by himself. Within the last ten years Gaede has designed a family of pumps of several stages, incorporating both the high vacuum and the fore-vacuum pump into a single unit. A recent outstanding development was the large single-stage diffusion pump designed by Gaede for work at Leiden on solid helium. This had the remarkable speed of several hundred litres per second at a pressure of 1/1,000 mm. mercury. Whilst it would not be correct to say that Gaede has been alone in designing the high vacuum pumps now in common use, it should be recognised that he provided the basis on which many others are built, and that he independently introduced all the methods which are used in present-day pumps.

The medal is awarded by the Council of the Physical Society not more frequently than once a year to persons who have contributed to the advancement of knowledge by the invention or design of scientific instruments or by the discovery of materials used in their construction.

Research on Atomic Energy

New Laboratory Opened at Cambridge

THE opening of the Royal Society's Mond Laboratory at Cambridge on February 3, by Mr. Baldwin, as Chancellor of the University, completes another chapter in one of the most fascinating of recent scientific histories. The new laboratory is an adjunct to the Cavendish Laboratory, and has been built for research on the effects of intense magnetic fields on the properties of matter. The researches of Professor P. Kapitza, developed during the last ten years in the Cavendish Laboratory, have shown that, if experiments can be carried out with sufficiently intense magnetic fields, many new and important properties of matter appear. By the adoption of a new principle, and by the use of enormous powers, Professor Kapitza has been able to produce at least five times the field given by the strongest magnet, and thereby to extend widely the range of magnetic investigations.

It is particularly fitting that the name of Dr. Ludwig Mond should be commemorated by the new laboratory. Owing in the first place to the generous benefaction of Dr. Mond to the Royal Society this laboratory has now been built. In the past Dr. Mond was a strong supporter of that pioneer of low temperature work, the late Sir James Dewar. Since the time of Dewar practically no cryogenic investigations have been carried out in this country, and the initiative in this field of work has passed to Holland, Canada and Germany. The laboratory is equipped with apparatus for the large-scale liquefaction of hydrogen, enabling temperatures of $-263°$ C. to be produced, while a further plant for the liquefaction of helium will allow of temperatures approaching absolute zero to be obtained. Thus the laboratory not only provides facilities for research on the magnetic properties of matter in the highest fields yet attained but also for the study of the properties of matter at the lowest possible temperatures, under which conditions atomic phenomena appear in an extremely interesting form. The laboratory thus materially increases the facilities for research work in pure physics in the University of Cambridge and will fill a long-felt want in the research organisations of this country.

New Copper Refining Process

Affinity between Iodine and Copper

IN order to lower the cost of refined copper, a group of Chilean technologists have patented a new chemical process, based on the affinity of iodine for copper. By means of this process, all copper is precipitated as cuprous iodide, unmixed with any other iodides. With the development of this process, it is hoped to produce a refined copper suitable for industrial purposes. The principal advantage of the process consists in the possibility of applying it, at a minimum cost, on all the ores of copper, even on those which require a large amount of sulphuric acid, as the process liberates a large amount of this acid during the precipitation of the cuprous iodide. In other words, this process, besides precipitating the copper from any solution liberates at the same time a quantity of sulphuric acid. It allows small plants to produce refined copper at prices which compare favourably with those of large producers, while permitting the large producers to lower their cost of production materially. Patents have been taken out in Italy and other countries.

Primary and High Temperature Tar

An Investigation of the Composition of Fractions

A REPORT of investigations on the "Composition of the Fractions of Primary and High Temperature Tar," has just been issued by the United States Bureau of Mines. This paper, the joint authors of which are E. B. Kester and W. D. Pohle, gives the results of work done under a co-operative agreement between the Bureau of Mines, and the American Gas Association, in connection with the study of the gas, coke and by-product making properties of American coals. The authors have made a special study of the composition of the corresponding fractions of low and high temperature tars from the same coal in order to throw light on the net effect of temperature and heat treatment on the primary products of coal decomposition in high temperature coking practice, with reference both to total quantities of chemically similar constituents and to their distribution throughout the boiling range.

No exactly parallel investigations are on record. The distribution of substances in high temperature tars is fairly well understood. Such tars are more or less similar, consisting of the more stable phenols, aromatic and olefinic compounds resulting from the pyrolytic decomposition of a wide variety of primary tar constituents. Low temperature tars, on the other hand, are much more complex and change in composition as the temperature of carbonisation is increased, resulting, finally, in high temperature tar.

In the present investigation, the primary tar was formed by distilling, at the lowest possible temperature, in an atmosphere of steam, in order to obtain the tar-forming constituents in as undecomposed a condition as possible. These are compared with the constituents obtained at a carbonising temperature of 1,000° C. The authors conclude that the primary tar first formed by heating coal at low temperature on further exposure to heat breaks downs in the following order:—paraffins and naphthenes, acids, neutral oil, aromatics, olefins and pitch. The olefins, aromatics and pitch appear to be the most resistant to change of type by pyrolysis, although there may be little structural similarity between the representatives of each found in the two tars. Copies of this Report (No. 3,197) may be obtained free of charge from the United States Bureau of Mines, Washington, D.C.

SULPHURIC acid has been extensively used in the hydration of propylene and butylene (from refinery gases) to propyl and butyl alcohols. In order to find possible alternative methods for the accomplishment of this hydration step, the applied chemisty research laboratory at the Massachusetts Institute of Technology has initiated a programme of work on the high pressure, catalytic, direct hydration olefines. Some results dealing with the hydration of 2-butene to 2-butanol have already been published, and work on the hydration of propylene is in progress. This latter work is being conducted as a doctor's thesis and will have as its objects the study of equilibrium conditions, catalysts for the reaction, and effect of such side reactions as polymerisation of the propylene.

News from the Allied Industries

Pottery

REPRESENTATIVES of the British Pottery Manufacturers' Federation and of the National Society of Pottery Workers have agreed that wages in the pottery industry should be stabilised for a further twelve months. The present rates of wages have been in operation since May, 1931.

Rubber

THE IMPORTANCE OF RESEARCH WORK was stressed at the meeting of the Midland Section of the Institution of the Rubber Industry, held in Birmingham, on February 2, Mr. F. G. W. King presiding. The two principal speakers were Mr. J. R. Scott and Mr. T. R. Dawson, members of the Rubber Research Association, who read short papers on "Scientific Work and Intelligence Services." The lecturers pointed out the valuable help given to scientific work by the intelligence services—the compilation of statistical information, analyses of trade statements and discoveries, etc. They hoped to convince other industries outside their own of the great value to be derived from such an organisation.

Bleaching and Dyeing

AS PART OF THE REORGANISATION SCHEME of the Bleachers' Association there is a likelihood of the operations of the Shuttleworth Bleaching Co., Ramsbottom, being transferred in the near future to the Holden Wood Bleachworks, Haslingden. About 70 employees will be effected. The transference is subject to the merchants being satisfied that the process which is carried on at Shuttleworth can be satisfactorily dealt with at the Holden Wood works.

THERE ARE PROSPECTS of a new industry being established at Lymm, Cheshire, if suitable arrangements can be made for dealing with the trade effluent. Two Manchester business men are understood to have approached the Urban Council before taking over the Barsbank Mill as a dyeworks. It is estimated that the trade effluent would amount to about 5,000 gallons daily. An official of the local authority stated that the Urban Council had reluctantly been compelled to decline so large a volume of trade effluent for the sewers until it had been treated.

Iron and Steel

A DECISION TO RENEW the international steel cartel for five years on the basis of production during the first six months of 1932 has been reached as a result of negotiations which have been taking place at Brussels between the presidents of the steel manufacturers' associations of France, Germany, Belgium, and Luxembourg. Agreement has equally been reached upon the quantities of production, but the full constitution of the cartel is dependent upon that of the Belgian steel cartel.

THE FRODINGHAM IRON AND STEEL CO. has restarted a blast furnace which has been out of operation since before Christmas, owing to repairs. The iron and steel trade still remains very quiet. A number of men who were temporarily suspended will be taken on again. There will now be two furnaces operating at the Frodingham works, and two at the Appleby works of the same combine—the United Steels, Ltd. With three other blast furnaces operating at the Normanby Park Steelworks there are now seven blast furnaces working in the Scunthorpe district out of a total of nineteen.

THE IMPORTANCE OF DISCOVERING new uses for iron and steel in order to find new outlets for the products of British iron and steel manufacturers was urged by the Earl of Dudley, at the annual dinner of the Staffordshire Iron and Steel Institute, at Dudley, on February 4. The iron and steel manufacturers of this country would never again be the steel lords of the world, said the Earl of Dudley, and iron and steel was no longer a staple industry. Many of their former customers were determined to supply their own wants, but he did not despair of the future of the trade. "It is most important," he said, "that we should do everything in our power both by experiment and by scientific research to find new uses for our products. I think there is an immense field for development in the use of alloys, nickel steel and non-corrosive steel."

Sugar

SUGAR IS TO BE ALLOWED to enter Chile duty free as from May 1, according to a decision reached by the Government. Consignments imported are to be paid for in Chilean goods.

THE SIXTEEN BEET SUGAR FACTORIES in England and Wales produced 107,691 tons in December, 1932, against 69,703 tons in December, 1931. The total for October-December is 303,351 tons in 1932, against 246,389 tons in 1931, according to the "Agricultural Market Report" of the Ministry of Agriculture.

Non-Ferrous Metals

AUSTRAL DEVELOPMENT, LTD., announces receipt of a cable from Electrolytic Zinc Co. of Australasia, Ltd., which gives the decision of the High Court on the matter of the debenture interest. The decision is that the provision of the Financial Emergency Act applies to the whole of the company's debentures, whether entered on the Melbourne or London register. Payment of interest at the reduced rate for the half-years ended November 14, 1931, May 14 and November 14, 1932, is therefore confirmed, and such reduced payments will continue during the operation of the Act.

Artificial Silk

ORDERS HAVE BEEN BOOKED in such large volume at the artificial silk works of British Bemberg, Ltd., at Doncaster, that the plant will be kept working night and day throughout the year.

THE BRITISH OUTPUT OF RAYON yarn and waste in December was 5,520,000 lb., against 6,590,000 lb. in November, 1932, and 6,070,000 lb. in December, 1931. The monthly average for the year 1932 showed a marked increase to 6,040,000 lb., against 4,550,000 lb in 1931 and 2,110,000 lb. in 1924.

THE NEWLY FORMED Artificial Silk (Rayon) Section of the Manchester Chamber of Commerce held its first meeting on February 3. Mr. Richard Bond, vice-president of the Chamber, who presided, expressed his view that it would be a valuable extension of the work of the Chamber and great service to an important and growing trade. Already between sixty and seventy representative firms have become members of the section, including those engaged in the production of artificial silk, the manufacture of artificial silk fabrics, merchanting, and finishing. The processing of yarns will also be well represented in the new section.

A Proprietary Preparation

Chemical Age Year Book Correction

GILL, JENNINGS AND EVERY-CLAYTON, patent agents, of Chancery Lane, London, W.C., inform us that the attention of their clients, United Water Softeners, Ltd., has been drawn to THE CHEMICAL AGE Year Book, 1933, in page 117 of which, under the heading "Names and Formulæ of Common Chemical Products," "Permutit" is shown as the common name for "artificial hydrated aluminium silicate with replaceable sodium."

They state that "Permutit" is, in fact, the registered trade mark of United Water Softeners, Ltd., and that it should not, therefore, have been included in the list of common names of chemical products.

Beyond this they point out that the statement is in itself incorrect, as the company does not apply its trade mark "Permutit" to artificial silicates as a rule. The entry should, therefore, be erased from page 117 of the Year Book.

New French Carbonisation Plant

A FRENCH company is constructing a coal carbonisation plant at Maubeuge in the north of France, which is planned to have an initial daily capacity of 250 metric tons with an eventful capacity of 1,000 tons. The plant is expected to be in operation towards the end of 1933. As a result of experiments, it is estimated that 1,000 kilos of coal, containing 32 per cent. of volatile matter will yield 1,500 lb. of semi-coke, 300 cubic metres of gas, and 50 litres of coal tar.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

CATALYTIC TREATMENT OF ORGANIC AND INORGANIC SUBSTANCES. W. T. R. Bindley. April 18, 1931. 386,982.

ANTHRAQUINONE DERIVATIVES. E. I. Du Pont de Nemours and Co. May 2, 1930. 386,989.

TREATMENT OF WASTE PRODUCTS OBTAINED IN THE REFINING OF HYDROCARBON MATERIAL. Trinidad Leaseholds, Ltd., and S. M. Blair. May 18, 1931. 386,977.

PROCESS OF REFINING OILS AND THE LIKE BY STEAM TREATMENT. G. Zotos. June 23, 1931. 386,993.

MANUFACTURE AND PRODUCTION OF AGENTS SUITABLE FOR USE AS ASSISTANTS IN THE TEXTILE AND ALLIED INDUSTRIES. J. Y. Johnson (*I. G. Farbenindustrie*). June 25, 1931. 386,966.

PURIFICATION OF SULPHUR OR SULPHUR-BEARING MATERIAL. Manchester Oxide Co., Ltd., R. H. Clayton, H. E. Williams, and H. B. Avery. July 17, 1931. 386,969.

MANUFACTURE OF ANTHRAQUINONE DERIVATIVES. J. F. Thorpe and A. A. Goldberg. July 24, 1931. 386,997.

PURIFICATION OF IMPURE SULPHUR. Manchester Oxide Co., Ltd., R. H. Clayton and F. W. Skirrow. Aug. 18, 1931. 387,019.

SYNTHETIC RESIN MOULDING POWDERS. Chloride Electrical Storage Co., Ltd., and R. T. Harrison. Nov. 28, 1931. 387,075.

MANUFACTURE AND PRODUCTION OF DYESTUFFS CONTAINING NITROGEN. J. Y. Johnson (*I. G. Farbenindustrie*). Dec. 23, 1931. 387,092.

MANUFACTURE OF HALOGENATED INDIGO AND ITS DERIVATIVES. J. Y. Johnson (*I. G. Farbenindustrie*). Jan. 29, 1931. 387,121.

PREPARATION OF ISOCYANINES CONTAINING β-NAPHTHO-QUINOLINE NUCLEI. Ilford, Ltd., and Dr. F. M. Hamer. Aug. 12, 1931. 387,167.

PRODUCTION OF ZINC SULPHIDE. New Jersey Zinc Co. May 19, 1931. 387,181.

PRODUCTION OF AQUEOUS COLLOIDAL SOLUTIONS. Dr. C. Gropengiesser. June 4, 1932. 387,212.

MANUFACTURE OF POLYAZODYESTUFFS. I. G. Farbenindustrie. June 17, 1931. 387,222.

MANUFACTURE OF ALKALI CARBONATE OR MIXTURES OF ALKALI HYDROXIDE WITH ALKALI CARBONATE AND AMMONIA. A. Mentzel. Aug. 21, 1931. 387,229.

EVAPORATERS. K. Vykoupil. July 18, 1932. 387,241.

PROCESS FOR THE MANUFACTURE OF WATERPROOF AND INSULATING PAPER. J. Knaggs and Portals, Ltd. Aug. 2, 1932. 387,248.

Applications for Patents

MELTING AND PURIFYING PRECIPITATES OF TIN. E. A. Ashcroft. Feb. 3. 3352.

PRODUCTION AND RECOVERY OF METALLIC TIN AND FERROUS CHLORIDE FROM STANNOUS CHLORIDE, ETC. E. A. Ashcroft. Feb. 3. 3353.

ELIMINATION OF IMPURITIES FROM METAL-BEARING ORES, ETC. E. A. Ashcroft. Feb. 3. 3354.

MANUFACTURE OF AZO DYESTUFFS CONTAINING CHROMIUM, ETC. A. Carpmael (*I. G. Farbenindustrie*). Feb. 1. 3136.

MANUFACTURE OF DERIVATIVES OF 1-NITRO ANTHROQUINONE-6-CARBOXYLIC ACID. E. I. Du Pont de Nemours and Co. Feb. 3. (United States, Feb. 3, '32.) 3425.

CATALYTIC MATERIALS. Handry Process Corporation. Feb. 3. (United States, March 23, '32.) 3349.

REGENERATION OF CONTACT MASSES. Handry Process Corporation. Feb. 3. (United States, April 13, '32.) 3350.

MANUFACTURE OF NITRILES OF RESIN ACIDS. I. G. Farbenindustrie. Feb. 2. (Germany, Feb. 2, '32.) 3215.

MANUFACTURE OF DYESTUFFS OF THE AZINE SERIES. I. G. Farbenindustrie. Feb. 2. (Germany, Feb. 2, '32.) 3251.

TEXTILE ASSISTANTS. Imperial Chemical Industries, Ltd. Jan. 30. 2895.

MANUFACTURE OF INDANTHRONE COMPOUNDS. Imperial Chemical Industries, Ltd., E. Burgoine and C. W. Soutar. Feb. 2. 3248.

MANUFACTURE OF COMPOSITIONS CONTAINING CELLULOSE DERIVATIVES, ETC. Imperial Chemical Industries, Ltd., and R. Burns. Feb. 3. 3381.

DYESTUFF INTERMEDIATES. Imperial Chemical Industries, Ltd., and K. H. Saunders. Feb. 4. 3470.

MANUFACTURE OF YEAST. Industrikemiska Aktiebolaget. Jan. 30. (Sweden, Jan. 30, '32.) 2875.

PRODUCTION OF RESINOUS CONDENSATION PRODUCTS. International General Electric Co., Inc. Feb. 2. (Germany, Feb. 3, '32.) 3234.

EXTRACTING FATS, OILS, ETC. A. R. Jahn. Feb. 3. 3382.

CONTINUOUS DISTILLATION OF MAGNESIUM. Oesterreichisch Amerikanische Magnesit Akt.-Ges. Feb. 2. (Austria, Feb. 11, '32.) 3218, and (Austria, Jan. 17), 3219 (cognate with 3218).

MANUFACTURE OF 3.4.5 TRISUBSTITUTED-TRIAZOLES (1.2.4.). Schering-Kahlbaum Akt.-Ges. Jan. 30. (Germany, Feb. 13, '32.) 2917.

MANUFACTURE OF AROMATIC AMINO BASES. Soc. of Chemical Industry in Basle. Jan. 31. (Switzerland, Feb. 3, '32.) 2905.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

A STEADY demand continues to be received in the London chemical market with prices on the whole unchanged and firm. Relatively quiet trading conditions have been reported by the majority of sellers on the Manchester chemical market during the past week. On the whole, deliveries into consumption are pretty well maintained in the aggregate, including those to textile dyeing and finishing establishments in the district. With regard to the latter, however, the slow conditions that are reported concerning new business in cotton textiles at the present time may have an unfavourable reaction upon the movements of chemicals in the near future. Meanwhile, the general tendency of chemical prices remains steady. Business has been steady in the Scottish market. No important changes in prices have to be reported. With the following exceptions the prices of chemical products remain the same as reported in THE CHEMICAL AGE of January 28 (pp. 84-85).

General Chemicals

ACID, CITRIC.—LONDON: 10d. per lb. less 5%. MANCHESTER: 9¾d.

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ARSENIC.—LONDON: £22 14s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £23 10s. at mines.

CARBON TETRACHLORIDE.—£42 to £47 per ton.

LEAD, ACETATE.—LONDON: White, £34 per ton. Brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36. Brown, £1 per ton less. MANCHESTER: White, £32 10s.; Brown, £31.

NICKEL AMMONIUM SULPHATE.—£53 per ton d/d.

NICKEL SULPHATE.—£53 per ton d/d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SULPHUR.—£12 per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9. Ground American, £10 ex store.

VERMILION.—Pale or deep, 4s. 5d. to 4s. 9d. per lb.

Pharmaceutical and Fine Chemicals

ACID, SALICYLIC.—B.P. pulv., 1s. 7d. to 1s. 10d. per lb.; technical, 1s. 2d. to 1s. 4d.

AMIDOPYRIN.—18s. 9d. to 20s. per lb.

PHENACETIN.—4s. to 4s. 6d. per lb.

PHENOLPHTHALEIN.—4s. 5d. to 5s. 8d. per lb.

SODIUM SALICYLIC.—Powder, 2s. to 2s. 8d. per lb.; crystal, 2s. 1d. to 2s. 2d. LONDON: Powder, 2s. to 2s. 8d., including packing and delivery; crystals, 1d. extra.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—9d. to 11d. per lb. Crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 2s. MANCHESTER: Crystals, 9½d.; crude, 2s. 5d. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.

ACID, CRESYLIC.—99/100, 1s. 7d. to 1s. 8d. per gal.; Refined, 1s. 8d. to 1s. 9d.; Pale, 98%, 1s. 5d. to 1s. 7d.; Dark, 1s. 2d. to 1s. 3d. LONDON: 98/100%, 1s. 3d. Dark 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER: £4 12s. 6d. to £4 17s. 6d. f.o.b. LONDON: £4 10s. to £4 12s. 6d. f.o.b. East Coast port.

From Week to Week

THE ANNUAL DINNER of the Oil and Colour Chemists' Association will be held on March 24, at the Trocadero Restaurant, London.

SIR CHARLES SHERRINGTON, Waynflete Professor of Physiology at Oxford, has been elected a foreign associate of the French Academy of Medicine.

DR. J. G. KING, chief chemist of H.M. Fuel Research Station, has been nominated for election as a member of the Council of the Institute of Chemistry.

MR. JUSTICE CLAUSON will deliver judgment in the Chancery Division on Monday next in the action by British Celanese, Ltd., against Courtaulds, Ltd., alleging infringement of letters patent for evaporative or dry spinning of cellulose acetate artificial silk.

MR. KENNETH MACKENZIE CLARK, J.P., of Argyle and Bournemouth, formerly of Paisley, chairman of the Aluminium Corporation, Ltd., the International Aluminium Co., Ltd., and Unity Investment Trust, Ltd., left property in England valued at £100,780.

THE SWEDISH GOVERNMENT has recently been requested to grant rights to a group of geological prospectors for the exploitation of some new mineral deposits. Among the most recently discovered are deposits of copper, zinc and argentiferous lead.

A FIRE AT THE WORKS of Sparklets, Ltd., Angel Road, Edmonton, on February 5, caused thousands of Sparklet bulbs containing carbon dioxide to explode, having the effect of a terrific machine-gun fire for nearly half an hour.

THE FRENCH TEXTILE FIRM of Toulemonde of Tourcoing is negotiating for the establishment of a factory on a site in Yorkshire. Another large French firm has also been negotiating for a factory at Bradford. The lead of these two firms is likely to give an impetus to other and more conservative firms which have been hesitant about establishing factories in Northern England.

THE RT. HON. VISCOUNT WOLMER, M.P., was the speaker at the Fifty-Ninth "Individualist" luncheon, held at Hotel Victoria, London, on February 8. For his subject the speaker dealt with the Post Office and the urgent need for drastic re-organisation carried out on the lines which would be applied in the case of an ordinary business concern.

TROOPS WERE SENT on February 2 to Ploesti, in Roumania, when workmen employed by the Rumano-American Petroleum Company attacked and wrecked the offices of the company. The Under-Secretary of State for the Interior left the previous night for Ploesti. The Standard Oil refineries have been damaged, but up to the present the principal refineries connected with British interests are unharmed.

AT A MEETING of the Liverpool section of the British Association of Chemists on February 1, Mr. C. B. Woodley, the general secretary, gave an account of the Association's activities. Professor E. C. C. Baly, the newly elected president, occupied the chair. In the course of his remarks, Mr. Woodley stated that one of the finest pieces of work by the Association was the establishment of the unemployment benefit fund in 1922. Members in high positions had given this their whole-hearted support, and over 1,400 appointments had been notified through the appointments bureau.

MR. F. J. KING, chief engineer of the Linde Air Products Co., was elected president of the Compressed Gas Manufacturers' Association at the annual meeting held at the Waldorf-Astoria in New York, on January 23 and 24. This election marks another recognition of Mr. King's outstanding contributions to technical progress in the compressed gas industry. He has been closely identified with the manufacture of oxygen and acetylene and the development of their applications, particularly in the expanding use of the oxy-acetylene welding and cutting process.

MR. J. W. BEAUMONT PEASE, chairman of Lloyds Bank, Ltd., announced, at the annual meeting of shareholders, in London, on February 3, the formation of a new organisation to help industry in research work. There was, he said, probably no direction affording a better prospect of rich reward to-day than scientific discovery. We must turn more and more to the research worker to point the way towards new advances, and industry must realise that an efficient and well-equipped research organisation was an essential element of good management.

DESPITE THE GRAVE FINANCIAL SITUATION with which it is faced, the many sections of the Hebrew University of Jerusalem, both scientific and non-scientific, are carrying out valuable work in Palestine. The report for the session 1931/2 contains numerous examples of the benefits to a developing country of the application of scientific research. The work of the scientific departments is devoted principally to research, undergradnate teaching having only just commenced. The chemistry department continued its investigation of problems connected with protein structure, and useful work has been carried out on the deposits found in the Dead Sea. The University Library has continued to grow at a great pace, and it now has an excellent collection of medical, scientific and technical books.

A FIRE BROKE OUT at the phosphate plant of the Billingham Synthetic Works on February 2, but was quickly extinguished.

DR. A. E. DUNSTAN, F.I.C., chief chemist of the Anglo-Persian Oil Co., has been nominated for election as a vice-president of the Institute of Chemistry.

THE CHILEAN EMBASSY IN LONDON is to become the central clearing house for information about the Chilean nitrate industry, according to instructions sent by the Foreign Office to Chilean diplomatic representatives in Europe.

MR. WILFRED SMITH, of Bute Cottage, 8 Lower Sutherland Crescent, Helensburgh, Dumbartonshire, and of 182 West Street, Glasgow, manufacturing chemist, son of the late Richard Smith, left £53,000, (personal estate in Great Britain £52,674, total).

AN EXPLOSION of a boiler took place at the Renault motor car works at Billancourt in France, on February 6, when the electric power house was destroyed. The casualties are officially given as six dead, and more than one hundred injured.

MR. L. G. RADCLIFFE, lecturer in organic chemistry at Manchester College of Technology, who was an original member of the college staff of lecturers, is shortly retiring. For some years he was hon. secretary of the Manchester section of the Society of Chemical Industry, and later chairman. He is now vice-president.

THE DANGER that university graduates may shortly find it more difficult to gain entry to the industries or the professions, was touched upon recently at a meeting of the Court of Leeds University. Leeds has an appointments board and can say that of the students graduating in July, 1931, not more than 8 per cent. were known to be unemployed by the December of that year.

THE LATEST METHODS OF OIL-BURNING for steam-raising were described by Mr. F. L. Bolt in a lecture to members of the Newcastle and District Association of Foremen Engineers and Draughtsmen, in the Mining Institute, on February 4. The lecture was illustrated with views of a special type of boiler used in the C.P.R. steamer Empress of Japan.

MR. H. L. PIRIE has been appointed by the Coal Utilisation Council, technical assistant to the Director from February 1. Mr. Pirie is an authority on gas producer practice and the author of several papers on the combustion and utilisation of coal. He took a prominent part in the formation of the Institue of Fuel, of which he is a founder member, and has acted as joint hon. secretary since its inception.

MANY LEADING MANUFACTURERS who are trading with Argentina will meet the members of the Argentine Trade Mission at a luncheon which is being given by Benn Brothers, Ltd., as publishers of "Industria Britanica," on February 15. The toast of the mission will be proposed by Mr. Beaumont Pease, chairman of Lloyds Bank and of the Bank of London and South America, and Dr. Roca, Vice-President of the Republic, will reply. Other speakers include Sir Gilbert Vyle and Dr. Leguizamon, and the chair will be taken by Mr. John Benn. Some of the guests will renew the acquaintances which they made two years ago at the Buenos Aires Exhibition, where nearly 1,000 British firms were represented.

AN INCREASE IN THE NET REVENUE balance from £2,030,842 in 1931, to £2,034,681 last year is shown in the accounts of the Gas Light and Coke Co. Revenue from sales of gas declined from £8,871,394 to £8,642,663, and rentals from £1,550,031 to £1,537,202, but the net income from residual products advanced from £1,774,539 to £1,886,832. Manufacturing costs were cut by nearly £400,000 to £5,440,658, but distribution charges absorbed £113,000 more at £2,870,160, and rents, rates and taxes, etc., at £642,921 were £65,603 higher than in 1931. The total expenses for 1932 were £10,079,891, against £10,211,597 for 1931, in which year debenture issue expenses amounting to £51,114 were written off. The ordinary stock again receives £5 12s. per cent. for the year.

Obituary

MR. ARTHUR VICTOR HUNT, chemicals department manager of Lever Bros., Ltd., Port Sunlight, at Port Sunlight Hospital on Tuesday, February 7. Mr. Hunt, who had held managerial positions with the firm for over 29 years, was the victim of an attack of influenza which developed into pneumonia. He leaves a widow and two children—one daughter and one son.

DR. WILLIAM THEVENAZ, at Hull, on February 5. Dr. Thevenaz was Swiss Consul for 20 years, a post from which he resigned a few years ago. Before going to Hull he was associated with the firm of Reid, Holliday and Co., Huddersfield. He had been an industrial chemist in Paris and he was an authority on analine dyes. He had done research work in Paris and Spain, and latterly took up the position of honorary demonstrator in the Department of Chemistry at the University College at Hull. He was a member of the Hull Chemical Society. At one time he was associated with the Selby Chemical Works. Aged 54.

THE CONTINUED AND INCREASING DEMAND for "What's Wanted: A list of Needed Inventions," published by the Institute of Patentees, has necessitated the issue of a third edition. This book, which can be obtained on application to the Institute, 39 Victoria Street, London, S.W.1, price 1s. 2d. post free, is issued for the purpose of giving the potential inventor some guidance as to the channel into which he should divert his natural ability so that his efforts may have some prospect of meeting with success.

A FACTORY SITE, rent free for fourteen years, is offered in Neston, Wirral, by the local Council of Social Service, which recently purchased the disused site of the Wirral Colliery and intends utilising it for the benefit of any industry that might accept the offer and thus provide employment in the district. There is an L.M.S. siding near by, and in addition the district possesses an excellent reservoir, electricity and gas, and the council is prepared to offer the existing offices.

Forthcoming Events

Feb. 13.—Institute of Metals (Scottish Section). "Modern Light Alloys, with Particular Reference to Corrosion." Leslie Aitchison. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Feb. 13.—University of Birmingham Chemical Society. Debate. "That the further Industrial Application of Chemistry is at present Inadvisable." 5.30 p.m. Chemical Lecture Theatre, Edgbaston, Birmingham.

Feb. 13.—Ceramic Society (Pottery Section). "Steam Boilers in Pottery Works and How to Run Them." John Phillips. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Feb. 13.—Institution of the Rubber Industry (London and District Section). "Some Developments in Rubber for Automobiles." Colin Macbeth. 7.30 p.m. First Avenue Hotel, High Holborn, London.

Feb. 13.—The Institute of the Plastics Industry (London and District Section.) "Varnishes and Laminated Materials." Dr. G. E. Haefely. 7.45 p.m. Windsor Castle Hotel, near Victoria Station, London.

Feb. 14.—Institute of Chemistry (Huddersfield Section). "Sugar Refining." A. C. Cumming.

Feb. 14.—Institute of Metals (N.E. Coast Section). "Further Experiments on Extrusion." C. E. Pearson. 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Feb. 14.—Royal Institution. "Analysis of Crystal Structure by X-Rays: A Review of the Work of Twenty Years." Sir William Bragg. 5.15 p.m. 21 Albemarle Street, London.

Feb. 14.—Institution of Petroleum Technologists. "Candles and Candle Making." David Allan. 5.30 p.m. Royal Society of Arts, John Street, Adelphi, London.

Feb. 14.—Institute of Metals (Swansea Section). "Platinum Metals." R. H. Atkinson. 6.15 p.m. Y.M.C.A., Swansea.

Feb. 14 and **15.**—Society of Glass Technology. The University, Sheffield.

Feb. 15.—Leicester Literary and Philosophical Society (Chemistry Section). "The Gas Fire for Domestic Heating." Dr. D. A. Winter. 7.30 p.m. College of Technology, Leicester.

Feb. 15.—Society of Dyers and Colourists (Midlands Section). "Vat Dyestuffs, their Application and Properties." F. Scholefield. Derby.

Feb. 15.—Institute of Chemistry (London and South-Eastern Counties Section.) "The Chemist in the Far East." Alexander Marcan. 7.30 p.m. 30 Russell Square, London.

Feb. 16.—Society of Chemical Industry and Institute of Chemistry. (Edinburgh and East of Scotland Sections). "Incompatibilities in Medical Prescriptions." J. Rutherford Hill. 36 York Place, Edinburgh.

Feb. 16.—The Chemical Society. Discussion on "The Raman Effect in Relation to some Chemical Problems," opened by Dr. J. J. Fox. 8 p.m. Burlington House, London.

Feb. 16.—Institute of Chemistry (Belfast and District Section). "Viscose and Acetate Artificial Silk." Dr. T. E. Ellison. 7.45 p.m. Royal Belfast Academical Institution, Belfast.

Feb. 16.—Society of Chemical Industry (Nottingham Section.) Short papers on "Problems I have met in Industry." 7.30 p.m. University College, Nottingham.

Feb. 16.—Manchester College of Technology Students' Chemical Society. "Vitamins." Dr. L. J. Harris. Large Chemical Lecture Theatre, E.17, Manchester College of Technology.

Feb. 17.—Institute of the Plastics Industry (Midlands Section). "Plastics Plant." W. Owen-Griffiths. 7.30 p.m. Midland Hotel, Temple Street, Birmingham.

Feb. 17.—Institution of Chemical Engineers. 11th Annual Corporate Meeting and Annual Dinner. Hotel Victoria, London

Feb. 17.—Society of Chemical Industry (Liverpool Section). "Solid CO_2 and its Uses." Dr. H. G. Littler. 6 p.m. University, Liverpool.

Feb. 17.—The Physical Society. 5 p.m. Imperial College of Science, South Kensington, London.

Feb. 17.—Society of Dyers and Colourists (Manchester Section). "Modern Water Softening." A. J. Mills. 7 p.m. 36 George Street, Manchester.

Feb. 17.—Society of Chemical Industry (Yorkshire Section) and Refractories Association of Great Britain. "Some Characteristics of the Clays used in Manufacturing Runners, Stoppers, Nozzles." J. E. Priestley and W. J. Rees. "The Reactivity of Cokes at Low Temperatures." C. B. Bolland and J. W. Cobb. 7 p.m. Royal Victoria Hotel, Sheffield.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to March 1, 1933.

Penetrodine. 536,201. Class 3. Chemical substances prepared for use in medicine and pharmacy. W. J. Bush & Co., Ltd., 28 Ash Grove, Hackney, London, E.8. October 29, 1932.

Plast-o-Crex. 536,988. Class 4. Resin used in the manufacture and preparation of paints, varnishes, lacquers and nitro-cellulose solutions. Rex Campbell & Co. Ltd., 7 Idol Lane, Eastcheap, London, E.C.3. November 25, 1932.

Colset. 536,688. Class 4. A bituminous emulsion for use as road dressing. The Paisley Oil and Chemical Co., Ltd., Farnham Road Trading Estate, Slough, Buckinghamshire. November 15, 1932.

Acticarbone-Hydra. 536,001. Class 4. Activated charcoal for absorbent or decolorising purposes. Société de Recherches et D'Exploitations Petrolifères, 75 Boulevard Haussmann, Paris, France. October 24, 1932. (Date claimed under International Convention, June 3, 1932.) Registration of this trade mark shall give no right to the exclusive use of the word "Hydra."

Chemical Trade Inquiries

The following trade inquiries have been received by the Editor of THE CHEMICAL AGE, to whom replies should be addressed, quoting the reference number of each inquiry.

Colloid Mills.—Names and addresses are required of manufacturers of colloid mills suitable for manufacturing in bulk quantities. (Ref. No. C.A./186.)

Fertilisers.—A firm of import and export agents wishes to obtain the names of suppliers of sulphate of potash and chloride of potash of the quality required for compounding fertilisers. Suppliers must be in a position to undertake export orders. (Ref. No. C.A./187.)

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Jamaica.—A firm of agents in Jamaica wishes to obtain representation of United Kingdom manufacturers of paints, varnishes, white lead, putty, lubricating oils. (Ref. No. 214.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Department of Public Health, Cairo, is calling for tenders, to be presented in Cairo by April 20, 1933, for the supply of proprietary articles, drugs and chemicals, galenicals and packed articles. (Ref. F.X. 1693.)

New Companies Registered

British Flame Proofing Co., Ltd., 7 Baldwins Gardens, Grays Inn Road, London, W.C.1. Registered on February 6. Nominal capital £100 in £1 shares. Objects: To acquire any interests in any patents, brevets d'invention licences, concessions and the like, and to carry on the business of chemists, druggists, drysalters, oil and colour men, etc. Directors: Bernard L. Hobrow, Edward J. Walker and Eric J. B. Hobrow.

British Standard Smokeless Fuel, Ltd., Dashwood House, 69 Old Broad Street, London, E.C.2. Registered on January 2. Nominal capital £100 in £1 shares. Distillers, extractors, producers, manufacturers and suppliers of all solid, liquid and gaseous substances or matter derived from coal and bituminous substances, etc. Subscribers: A. G. L. Try and E. W. Harrold.

China Clay Freeholds, Ltd. Registered on February 2. Nominal capital of £10,000 in £1 shares. The objects: to acquire lands, buildings, mines, quarries, claypits and premises; to buy, search for, deal in and prepare for market, china clay, china stone of all kinds ball clay, builders' materials, chemicals and other cognate substances, silica, quartz, etc. Subscriber: H. N. Sporborg, 18 Austin Friars, London, E.C.2.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BRITTOL SYNDICATE, LTD., London, S.W. (M., 11/2/33.) Reg. Jan. 28. £1,000 debentures, part of £20,000 (not ex.); general charge. *£8,000. Apr. 29, 1932.

OZONIC, LTD. (late Ozonic Mineral Water Co., Ltd.), Westwood (Kent). (M., 11/2/33.) Reg. Jan. 27. £10,000 debenture, to Branch Nominees, Ltd., 15 Bishopsgate, E.C.; general charge. *Nil. Apr. 13, 1931.

UNITED PHOSPHATE AND MALT CO., LTD., London, N. (M., 11/2/33.) Reg. Jan. 25, Land Registry charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 40a Wharfdale Road, Islington; also reg. Jan. 31, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on premises at Chase Estate, Acton. *Nil. Nov. 14, 1932.

Satisfactions

BITMAC, LTD., Scunthorpe, tar distillers. (M.S., 11/2/33.) Satisfaction reg. Jan. 27, £1,500, reg. Apr. 28, 1932.

CROSFIELD (JOSEPH) AND SONS, LTD., Warrington, soap manufacturers. (M.S., 11/2/33.) Satisfactions reg. Jan. 28, £150,000 and £140,000, both outstanding July 1, 1908, and reg. Apr. 9, 1906, and Mar. 23 and 28, 1916.

FURMOTO CHEMICAL CO., LTD., London, S.W. (M.S., 11/2/33.) Satisfaction reg. Jan. 31, of debs. reg. Feb. 10, 1930, to extent of £2,000.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

TRENT CHEMICAL PRODUCTS, 292 Alfred Street Central, Nottingham, chemical merchants. (C.C., 11/2/33.) £13 4s. 9d. Dec. 19.

London Gazette, &c.

Company Winding Up Voluntarily

GELATINE AND PHOSPHATES, LTD., (C.W.U.V., 11/2/33.) By special resolution Feb. 1. Mr. Sydney Robert Smith, 78 Kinveachy Gardens, Little Heath, London, S.E.7, appointed liquidator.